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HARVARD SCHOOL
OF
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Announcement of Courses and General Information

1969-70

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PUBLISHED BY THE UNIVERSITY

Graduate students from many parts of the world come to study in Harvard's School of Public Health. Physicians, engineers, physical scientists, social scientists, and other health specialists prepare here for careers of leadership in teaching, research and the administration of health services, both nationally and internationally.

The Harvard School of Public Health operates as an autonomous unit of Harvard University in close association with the Faculties of Arts and Sciences, Divinity, Government, Business Administration, Education, Law, Medicine and Dental Medicine.

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Building "One" of the Health Sciences Laboratories of the Harvard School of Public Health houses the Kresge Center for Environmental Health, the Department of Demography and Human Ecology (including parts of the Center for Population Studies), and the Departments of Tropical Public Health, Microbiology, Biostatistics, and Epidemiology.

ONE

INTRODUCTORY INFORMATION

ACADEMIC CALENDAR–1969-1970

***SEPTEMBER 8, MONDAY, 10 A.M.**	Opening session and registration for new International Students
***SEPTEMBER 10, WEDNESDAY, 2 P.M.**	Opening session and registration for new U.S. Students

The period between the opening sessions and September 17 will be devoted to orientation lectures, individual conferences with faculty members, and selection of courses of study.

***SEPTEMBER 15, MONDAY, 10 A.M.**	Opening session and registration for students enrolled in 1968–69.

FALL TERM, SEPTEMBER 17, 1969 THROUGH JANUARY 31, 1970

SEPTEMBER 17, WEDNESDAY	First Period Courses begin
OCTOBER 13, MONDAY	Columbus Day: a holiday
NOVEMBER 11, TUESDAY	Veterans' Day: a holiday
NOVEMBER 15, SATURDAY	First Period ends
NOVEMBER 17, MONDAY	Second Period Courses begin
NOVEMBER 27 and 28, THURSDAY and FRIDAY	Thanksgiving Recess

Recess from Sunday, December 21, 1969 through January 4, 1970

JANUARY 7, WEDNESDAY	Spring Term Orientation Day
JANUARY 24, SATURDAY	Second Period Courses end
JANUARY 26, MONDAY through JANUARY 31, SATURDAY	Directed reading period, supervised special studies or field observations

* All students are required to attend the opening session and to be present for the registration period.

SPRING TERM, FEBRUARY 2, 1970 THROUGH JUNE 11, 1970

FEBRUARY 2, MONDAY	Third Period Courses begin
FEBRUARY 16, MONDAY	Washington's Birthday: a holiday
MARCH 28, SATURDAY	Third Period ends

Recess from Sunday, March 29, 1970 through Sunday, April 5, 1970

APRIL 6, MONDAY	Fourth Period Courses begin
MAY 25, MONDAY	Memorial Day: a holiday
MAY 30, SATURDAY	Fourth Period ends
JUNE 1, MONDAY through JUNE 10, WEDNESDAY	Post-class Period — Forums
JUNE 11, THURSDAY	Commencement

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*ARTHUR JACQUES LESSER — A.B., M.D., M.P.H., Visiting Lecturer on Maternal and Child Health; *Deputy Chief, Children's Bureau, United States Department of Health, Education and Welfare.*

*SAMUEL LEVEY — A.B., A.M., A.M., Ph.D., S.M. in Hyg., Visiting Lecturer on Health Services Administration; *Professor of Health Services Administration, Mt. Sinai Medical School, New York.*

*JOHN HOWARD LUDWIG — S.B., S.M., S.M. in Hyg., S.D. in Hyg., Visiting Lecturer on Community Air Pollution; *Assistant Commissioner for Science and Technology, National Air Pollution Control Administration, Department of Health, Education and Welfare.*

*MORTON ABRAHAM MADOFF — A.B., M.D., Lecturer on Microbiology; *Director, Division of Biologic Laboratories, State Laboratory Institute, Massachusetts Department of Public Health.*

*CURTIS PERRY MC LAUGHLIN	A.B., M.B.A., D.B.A., Visiting Lecturer on Health Systems Analysis; *Associate Professor of Business Administration, University of North Carolina.*
*ROBERT WARWICK MILLER	A.B., M.D., M.P.H., Dr.P.H., Visiting Lecturer on Epidemiology; *Chief, Epidemiology Branch, National Cancer Institute.*
*ROBERT MORRIS	A.B., S.M., D.S.W., Lecturer on Social Planning; *Professor of Social Planning, The Florence Heller Graduate School for Advanced Studies in Social Work, Brandeis University.*
*HARRY MOST	S.B., M.D., D.T.M.&H., D.M.S., Visiting Lecturer on Tropical Public Health; *Herman N. Biggs Professor and Chairman, Department of Preventive Medicine, New York University School of Medicine.*
*KENNETH WILLIAM NELSON	Ed.B., S.M., Visiting Lecturer on Environmental Health; *Director, Department of Hygiene and Agricultural Research, American Smelting and Refining Company.*
*ROBERT BROWN PENNELL	S.B., S.M., Ph.D., Visiting Lecturer on Immunology; *Director, Blood Research Institute, Inc.*
*HARRY TARLEY PHILLIPS	M.B.,Ch.B., D.P.H., M.D., Visiting Lecturer on Health Services Administration; *Chief of Bureau of Chronic Disease Control, Massachusetts Department of Public Health and Superintendent, Lemuel Shattuck Hospital.*
*CHARLES HENRY RAMMELKAMP	A.B., M.D., S.D. (hon.), Visiting Lecturer on Microbiology; *Professor of Medicine and Preventive Medicine, Case Western Reserve University School of Medicine.*

*ANDREW PAUL SACKETT	M.D., D.P.H., Visiting Lecturer on Health Services Administration; *Commissioner, Department of Health and Hospitals, City of Boston.*
*HARRY FRANK SCHULTE	B.Chem.Eng., S.M., Visiting Lecturer on Environmental Health Engineering; *Group Leader, Industrial Hygiene Group, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.*
*NEVIN STUART SCRIMSHAW	A.B., A.M., Ph.D., M.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Professor of Nutrition and Head, Department of Nutrition and Food Science, Massachusetts Institute of Technology.*
*DAVID JUDSON SENCER	M.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Chief, National Communicable Disease Control Center.*
DAVID SIDNEY SHAPIRO	A.B., Ph.D., Lecturer on Social Psychiatry.
*EMILIO CESARE VENEZIAN	B.Eng., S.M., Ph.D., Lecturer on Epidemiology; *Member, Operations Research Section, Arthur D. Little, Inc., Cambridge.*
*EDWARD LOWERY WALLS, JR.	S.B., A.M., Visiting Lecturer on Health Services Administration; *Assistant Professor of Finance, Northeastern University.*
*ROBERT BRIGGS WATSON	S.B., M.D., M.P.H., Visiting Lecturer on Tropical Health; *Lecturer on International Health, School of Public Health, University of North Carolina.*
*HENRY WECHSLER	A.B., A.M., Ph.D., Lecturer on Social Psychology; *Research Director, Medical Foundation, Inc.*
*JOHN MARSHALL WEIR	S.B., M.D., Ph.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Director, Medical and Natural Sciences, The Rockefeller Foundation.*

*OLIVER LEO WELSH — S.B., A.M., Ed.D., Visiting Lecturer on Audiology; *Chief Audiologist, Veteran's Administration Clinic, Boston.*

*JOSEPH ANTHONY YACOVONE — A.B., D.M.D., M.P.H., Lecturer on Dental Public Health; *Executive Director, Office of Comprehensive Planning, Rhode Island Department of Health.*

INSTRUCTORS

*HELEN DOROTHY COHN — M.P.H., Instructor in Applied Public Health Nursing; *Associate Professor of Public Health Nursing, Boston University School of Nursing.*

*RUTH ADA COWIN — S.B., S.M., Instructor in Applied Public Health Social Work.

*RODRIGO GUERRERO — M.D., S.M. in Hyg., Dr.P.H., Instructor in Demography and Human Ecology; *Assistant Director, Fundación H. Carvajal, and Auxiliary Professor, Faculty of Medicine, Department of Preventive Medicine, University of Valle, Colombia.*

*DAVID ROBERT KINLOCH — M.D., D.P.H., S.M. in Hyg., Instructor in Health Services Administration; *Director of Medical Care, Massachusetts Department of Public Health.*

TEACHING FELLOWS

DOUGLAS IRA HAMMER — S.B., M.D., M.P.H., Teaching Fellow in Epidemiology.

ALEXANDER JOHN MC LEAN — B.E., M.E., S.M. in Hyg., Teaching Fellow in Epidemiology.

JOHN WALKER POUNDSTONE — A.B., M.D., M.P.H., Teaching Fellow in Epidemiology.

THE RESEARCH STAFF

SENIOR RESEARCH ASSOCIATES ‡

CARL COLEMAN SELTZER — A.B., Ph.D., Senior Research Associate in Biological Anthropology.

‡ Appointments with administrative tenure.

JOHN BENJAMIN WYON	B.A., M.B.,B.Ch., M.P.H., Senior Research Associate and Lecturer on Population Studies.
ALFRED YANKAUER	A.B., M.D., M.P.H., Senior Research Associate and Lecturer on Maternal and Child Health.

RESEARCH ASSOCIATES §

*HARBEN JAY BOUTOURLINE-YOUNG	M.B.,B.S., D.C.H., M.D., Research Associate in Human Growth and Development.
*SAM LILLARD CLARK, JR.	M.D., Research Associate in Anatomy; *Professor and Head, Department of Anatomy, University of Massachusetts School of Medicine.*
ROBERT ALLEN DANLEY	A.B., S.M., Ph.D., Research Associate in Sociology.
HELEN GIDEON	M.B.,B.S., M.P.H., Research Associate in Population Studies.
ROLAND CHESLEY MOORE	A.B., A.M., Ph.D., Research Associate in Occupational Safety.
FREDERICK JAMES VILES, JR.	S.B., S.M., Research Associate and Lecturer on Industrial Hygiene.

RESEARCH ASSOCIATES

*CARL JAY BAJEMA	S.B., A.M., Ph.D., Research Associate in Population Studies.
*GRETCHEN MARY BERGGREN	A.B., M.D., S.M. in Hyg., Research Associate in Demography and Human Ecology; *Assistant to the Director, Community Health Program, Hôpital Albert Schweitzer, Haiti.*
*MARTHA DRESNER BERLINER	A.B., A.M., Ph.D., Research Associate in Microbiology; *Assistant Professor of Biology, Simmons College.*
EDWARD JAMES BURGER	B.Sc., M.D.C.M., M.I.H., S.D. in Hyg., Research Associate in Physiology.

§ Term appointments.

RUTH MARGARET BUTLER	A.B., S.M., Research Associate in Social Work.
*HECTOR ANTONIO CASTELLANOS	B.S., M.D., Research Associate in Nutrition.
FRANCISCO COBOS	M.D., Research Associate in Child Psychiatry.
*ARTHUR PHILIP CONNELLY, JR.	A.B., M.D., Research Associate in Medicine; *Chief of Medicine, Cardinal Cushing Hospital, Brockton.*
THOMAS JOSEPH CROWLEY	S.B., S.M., Research Associate in Environmental Health and Safety.
JOHANNA TODD DWYER	S.B., S.M., S.M. in Hyg., S.D. in Hyg., Research Associate in Nutrition.
*CHARLES EDWARD OVID FRASER	B.V.Sc., M.R.C.V.S., D.T.V.M., S.M., Ph.D., Research Associate in Microbiology; *Microbiologist, New England Regional Primate Research Center.*
*ROSE EPSTEIN FRISCH	A.B., A.M., Ph.D., Research Associate in Population Studies.
*KENNETH FRANCIS GIRARD	S.B., M.Sc., Ph.D., Research Associate in Microbiology; *Assistant Director, Division of Diagnostic Laboratories, State Laboratory Institute, Massachusetts Department of Public Health.*
ZVI GLICK	B.Sc., S.M., Ph.D., Research Associate in Nutrition.
OTTO GRUBNER	Ph.D., Research Associate in Environmental Chemistry.
KENNETH CRONISE HAYES	A.B., D.V.M., Ph.D., Research Associate in Nutrition.
AGNES MAYER HUBER	B.Sc., Ph.D., Research Associate in Nutrition.
FRANCIS XAVIER KAMIENSKI	S.B., A.M., Ph.D., Research Associate in Toxicology.
MICHAEL DAVID KLEIN	A.B., M.D., Research Associate in Medicine.

BERNARD DAVID KOSOWSKY	A.B., M.D., Research Associate in Medicine.
*CHARLOTTE FITTING LITT	A.B., S.M., Ph.D., Research Associate in Tropical Public Health.
HARRY LOUIS MC COMBS	S.B., M.D., Research Associate in Pathology.
MARIA LUCILA MILANESI	M.D., Research Associate in Populations Studies.
*JOSEPH MORTON MILLER	A.B., M.D., M.P.H., Research Associate in Medicine; *Senior Associate in Medicine, Peter Bent Brigham Hospital.*
*RAYMOND LEO HARRINGTON MURPHY, JR.	S.B., M.D., M.P.H., S.D. in Hyg., Research Associate in Occupational Medicine; *Project Coordinator, Medical Station, Logan Airport.*
*ALICE LONGAKER NANGERONI	A.B., Research Associate in Behavioral Sciences.
CHARLES NEAVE	A.B., M.D., M.P.H., Dr.P.H., Research Associate in Population Studies.
NASSER SHOKOUHI NEJAD	A.B., Ph.D., Research Associate in Nutrition.
MARIE EBE RECA	Dr.Chem., Research Associate in Medical Mycology.
*PETER PHILIP ROGERS	B.Eng., S.M., Ph.D., Research Associate in Population Studies; *Assistant Professor of Environmental Engineering, Harvard University, Assistant Professor of City Planning, Graduate School of Design.*
DENNIS JOHN SABO	S.B., M.D., Ph.D., Research Associate in Nutrition.
*CONSTANTINA SAFILIOS-ROTHSCHILD	S.M., Ph.D., Research Associate in Population Studies.
*DONALD WILLIAM THOMAS	A.B., A.M., Ph.D., Research Associate in Psychology; *Assistant Professor of Psychology, Simmons College.*

*JOHN MASON TYLER	A.B., M.D., Research Associate in Physiology; *Senior Physician and Director of the Pulmonary Laboratory, Lemuel Shattuck Hospital.*
VYTAUTAS IGNAS UZGIRIS	A.B., S.B., M.D., Ph.D., Research Associate in Population Studies.
MARY JEAN WALLACE	S.B., Ph.D., Research Associate in Population Studies.
CHARLES MATHEWSON WHEELER	S.B., S.M., Ph.D., Research Associate in Entomology.
CARMEN ALONSO WHIPPLE	B.S., M.A., Ph.D., Research Associate in Population Studies.
STELLA BERNADETTE YEN	M.D., M.P.H., Research Associate in Epidemiology.

RESEARCH AND FIELD STAFF

*RODERICK ANTONY ARMSTRONG	B.A., L.M., S.S.A., Research Consultant on Social Psychiatry; *Executive Director, Digby-Annapolis Mental Health Service Board, Inc.*
*ROGER PAUL BERNARD	M.D., S.M. in Prev. Med., Consultant on Family Planning; *Research Director, The Pathfinder Fund, Boston.*
*JEAN-NOEL FORTIN	B.A., M.A., M.D., Consultant on Psychiatry; *Associate Professor of Psychiatry, Department of Psychiatry, University of Montreal.*
*JOHN SNODGRASS HARDING	A.B., A.M., Ph.D., Research Consultant on Psychology; *Professor, Department of Child Development and Family Relationships, Cornell University.*
*EDMUND HALSEY KELLOGG	A.B., LL.B., Consultant on Family Planning; *Deputy Executive Director, The Pathfinder Fund, Boston.*
*ELTON KESSEL	A.B., M.D., M.P.H., Consultant on Family Planning; *Executive Director, The Pathfinder Fund, Boston.*

*DANIEL JOHN O'CONNELL	M.D., Consultant on Psychiatry; *Executive Secretary, Association of American Indian Affairs.*
VICTOR GEORGE CARDOZA	Field Project Administrator.

RESEARCH FELLOWS

WARREN JAMES ARTER	M.B.,B.S., Research Fellow in Nutrition.
ISAAC BARR	M.D., Research Fellow in Nutrition.
MONTE PAUL BAWDEN	A.B., Ph.D., Research Fellow in Tropical Public Health.
MARTIN KASPAR ESCHER	M.D., M.P.H., Research Fellow in Tropical Public Health (through January 31, 1970).
KEVIN EUGENE FINUCANE	M.B., B.S., M.R.A.C.P., Research Fellow in Physiology.
DANIEL ANTHONY GARCIA	D.D.S., M.D.S., S.M. Hyg., Research Fellow in Radiobiology.
ALEJANDRO ENRIQUE GRASSINO	M.D., Research Fellow in Physiology.
TIMOTHY EDWARD GUINEY	S.B., M.D., Research Fellow in Nutrition.
ROBERT STEPHEN HATTNER	S.B., M.D., Research Fellow in Nutrition.
JOSEPH OWEN HENDLEY	A.B., M.D., Research Fellow in Tropical Public Health.
PHILIP ISAAC HERSHBERG	B.E.E., M.E.E., M.D., Research Fellow in Nutrition.
THOMAS JAMES HIXON	S.B., A.M., Ph.D., Research Fellow in Physiology.
GARY LOUIS HUBER	S.B., S.M., M.D., Research Fellow in Physiology.
HANS RUDOLF JENZER	M.D., Research Fellow in Nutrition.
JAY SIGMUND KERZNER	A.B., M.D., Research Fellow in Nutrition.

GAVRIEL LEWINSOHN	M.D., Research Fellow in Physiology.
BASIM FUAD MUSALLAM	B.A., M.A., Research Fellow in Population Studies.
RENÉ LOUIS PESLIN	M.D., Research Fellow in Physiology.
PETER DUHIG PHELAN	B.Sc., M.B.,B.S., M.D., Research Fellow in Physiology.
KENNETH WAYNE SAMONDS	S.B., S.M., Ph.D., Research Fellow in Nutrition.
MARCEL SEILER	M.D., Research Fellow in Nutrition.
JACK BORDEN TAYLOR	S.B., M.D., Research Fellow in Nutrition.
HASI MAJUMDAR VENKATACHALAM	I.Sc., M.B.,B.S., M.P.H., Research Fellow in Demography and Human Ecology.
JOSEPH LLOYD WANER	S.B., S.M., Ph.D., Research Fellow in Tropical Public Health.
MARSHALL ALAN WOLF	A.B., M.D., Research Fellow in Nutrition.
DONOVAN BYRON YEATES	M.Sc., Research Fellow in Radiological Health.
HIDEO YUSA	B.S., D.Eng., Research Fellow in Radiological Health.

ASSISTANTS

DOROTHY BRUNO	S.B., Assistant in Nutrition
*JANET WALKLEY CARES	S.B., S.M. in Hyg., Assistant in Industrial Hygiene
ETHEL JAFARIAN DUFFETT	S.B., Assistant in Nutrition.
MIRIAM CATHERINE EKDAHL	S.B., S.M. in S.S., Assistant in Social Work.
THOMAS PATRICK FAHERTY	Assistant in Microscopy.
ANN HATHAWAY	A.B., Assistant in Microbiology.
JOSEPH CHARLES KERN	A.B., Assistant in Behavioral Sciences.

* LEO LEVINE	S.B., Assistant in Microbiology; *Chief of Laboratory, Division of Biologic Laboratories, State Laboratory Institute, Massachusetts Department of Public Health.*
DOROTHY ELIZABETH MC COMB	S.B., Assistant in Microbiology.
DIANE ELAINE OLSON	A.B., S.M., Assistant in Psychophysiology.
MILDRED ROSE RENSI	S.B., Assistant in Epidemiology.
*TERESA RONDON ROTA	A.M., Assistant in Microbiology.
* JUDITH MILLER SPIELMAN	S.B., S.M. in Hyg., Assistant in Microbiology.
AMORITA CASTRO SUAREZ	S.B., Assistant in Behavioral Sciences.
SUSAN KEMP WHEELDON	B.Sc., A.M., Assistant in Tropical Public Health.
JELIA COX WITSCHI	S.B., S.M., Assistant in Nutrition.

PROFESSORS EMERITI

DONALD LESLIE AUGUSTINE	S.B., S.D., S.D. (hon.), A.M. (hon.), Professor of Tropical Public Health, Emeritus (1961).
PHILIP DRINKER	S.B., Chem.E., S.D. (hon.), LL.D., A.M. (hon.), Professor of Industrial Hygiene, Emeritus (1961).
MARTHA MAY ELIOT	A.B., M.D., L.H.D., S.D. (hon.), LL.D., Professor of Maternal and Child Health, Emerita (1960).
GORDON MASKEW FAIR	S.B., S.M. (hon.), Dr.Ing. (hon.), Dr. (hon.), Sc.D. (hon.), Abbott and James Lawrence Professor of Engineering, and Gordon McKay Professor of Sanitary Engineering, Emeritus (1965).
FRANZ GOLDMANN	M.D., Associate Professor of Medical Care, Emeritus (1958).

JOHN EVERETT GORDON — S.B., Ph.D., M.D., A.M. (hon.), F.R.C.P. (Lond.), Professor of Preventive Medicine and Epidemiology, Emeritus (1958).

ALICE HAMILTON — M.D., A.M. (hon.), S.D. (hon.), Assistant Professor of Industrial Medicine, Emerita (1935).

HUGH RODMAN LEAVELL — S.B., M.D., Dr.P.H., Professor of Pub lic Health Practice, Emeritus (1963)

HUGO MUENCH — A.B., M.D., Dr.P.H., A.M. (hon.), Professor of Biostatistics, Emeritus (1961).

ELIZABETH PRINCE RICE — A.B., S.M., Associate Professor of Public Health Social Work, Emerita (1967).

GEORGE CHEEVER SHATTUCK — A.B., M.D., A.M. (hon.), Clinical Professor of Tropical Medicine, Emeritus (1947).

RICHARD MASON SMITH — A.B., M.D., S.D. (hon.), Thomas Morgan Rotch Professor of Pediatrics, Emeritus (1946).

HAROLD COE STUART — Litt.B., M.D., A.M. (hon.), Professor of Maternal and Child Health, Emeritus (1958).

The School and Its Facilities

The Harvard School of Public Health is primarily devoted to graduate education in public health and its aim is to provide opportunities for those who seek careers in one or more of the principal areas of public health activities — teaching, research, and the administration of health services, both nationally and internationally.

Public health evolved from the early combination of medical science and engineering for the control of environmental hazards. It has grown to embrace various facets of the biological, physical and social sciences as community aspects of health problems have become more complex and demanding. Public health now depends upon the skills and knowledge of members of several professions. The role of a graduate school of public health today is to prepare those who will be concerned with health problems which lie outside the scope of any single discipline, problems which can be solved best by the skillful cooperation of physicians, nurses, engineers, physical scientists, social scientists and other health specialists.

HISTORY OF THE SCHOOL

Activity in professional education in the field of public health had been steadily increasing in Harvard University over a period of more than two decades before the actual founding of the School, in 1922. The development was a gradual one, characterized by certain important steps, the first of which was the establishment in 1909 of the Department of Preventive Medicine and Hygiene in the Medical School — the first such department in the United States. The degree of Doctor of Public Health was first conferred in 1911. In this same year a Department of Sanitary Engineering was inaugurated in the Graduate School of Engineering. In 1913 the Department of Tropical Medicine, and in 1918 the Division of Industrial Hygiene, with clinical and laboratory facilities, were organized in the Harvard Medical School.

In 1913 the Harvard-Massachusetts Institute of Technology School for Health Officers was formed under the joint management of Harvard University and the Massachusetts Institute of Technology. This School operated until the fall of 1922, when it was superseded by the Harvard School of Public Health which was made possible by a generous endowment for this purpose from The Rockefeller Foundation.

When the School first opened, several departments were set up as joint departments with the Medical School, with shared facilities, faculty and budgets. This arrangement continued until 1946 when another grant from The Rockefeller Foundation provided additional space and facilities for the School of Public Health. At this time the School was separated administratively and financially from the Medical School and became an autonomous unit of Harvard University. It continues to cooperate with the Medical School in teaching and research, and has also developed close association with other schools of the University, particularly the Graduate Schools of Arts and Sciences, Government and Business Administration.

OBJECTIVES OF THE SCHOOL

The objectives of the School of Public Health are the advancement and dissemination of knowledge relating to human health and well-being. To fulfill these objectives the School provides instruction to graduate students and research fellows, conducts research, and participates in national and international health activities.

In its efforts to advance knowledge, the School is concerned with health problems of major importance to society, not only in the highly urbanized and technologically advanced regions, but also in the predominantly rural or economically disadvantaged areas of the world.

The educational program of the School provides advanced instruction in the community-oriented health sciences and in the techniques of administration for highly qualified young men and women who have potential for imaginative leadership.

In its involvement in the contemporary health problems of so-

ciety, the School collaborates with community leaders in seeking ways in which knowledge can be effectively used for the advancement of human health. The School is particularly concerned with the development of realistic social policies in relation to health problems and population growth. New developments in these fields may be reflected in elective courses designed to meet the special needs and interests of students at their request. Such courses are usually offered in the individual departments under the tutorial program.

DUAL ROLE OF THE SCHOOL

The School has accepted the dual role of (1) a professional school that provides for the generalist a comprehensive broad program of basic knowledge in relevant health sciences and (2) a

graduate school that provides advanced instruction and opportunities for independent study in depth for those students who seek to become specialists in one of the public health disciplines. To fulfill these roles, two different degree programs are offered. One involves the professional degrees of Master and Doctor of Public Health with a wide range of required subjects. Candidates for these degrees must be graduates of approved schools of medicine, dentistry or veterinary medicine; in some cases, qualified individuals who hold doctoral degrees in the biological sciences may be admitted to the program.

The other program leads to the degrees of Master and Doctor of Science in Hygiene in a chosen field, and provides the opportunity to concentrate intensively in an area of special interest, The backgrounds of the candidates for these degrees range across the physical, biological and social sciences — engineers, health educators, nurses, nutritionists, social workers and statisticians. Individuals with a doctoral degree in the medical or biological sciences may elect these programs if they prefer a specialized area of study.

THE LOCATION AND BUILDINGS

The twelve departments of the School of Public Health are housed in the Rotch Building at 55 Shattuck Street and the Health Sciences Laboratories at 665 Huntington Avenue, Boston. The administrative offices are in the Rotch Building. The School's buildings are adjacent to the Harvard Medical and Dental Schools, the Countway Library of Medicine, the Children's Medical Center, and the Peter Bent Brigham Hospital.

OTHER FACILITIES

The facilities of the hospitals and the adjacent institutions are available to qualified students of this School, and are used in connection with the teaching of various subjects. In addition, students enrolled at the School may take courses in other departments of Harvard University, such as in the social sciences, public administration, economics, statistics and medical sciences. Certain graduate

courses at the Massachusetts Institute of Technology are also open to students of this School.

The Department of Sanitary Engineering of the School is also part of the Division of Engineering and Applied Physics of the Harvard Graduate School of Arts and Sciences in Cambridge. Qualified students may register for courses given by the Division of Engineering and Applied Physics.

The School maintains a close association with a wide variety of health, medical care, and welfare organizations in Massachusetts and elsewhere. These include health departments, hospital and other medical facilities, private health and welfare agencies, and community planning groups. These organizations provide opportunities for observation and special studies, and members of their staffs are available to assist in the School's educational program. Administrative methods at local levels may be studied at first hand in some of these agencies in the Greater Boston Area.

The State Laboratory Institute of the Massachusetts Department of Public Health is engaged in a program of general interest, attracting visitors and students from various parts of the United States and from foreign countries. It performs a wide variety of bacteriological, immunological and chemical procedures, and is engaged in several research programs. Its Superintendent is a member of the Faculty. This close contact with one of the country's outstanding laboratories provides excellent opportunities for qualified students who wish to obtain intensive experience in many types of laboratory methods of particular pertinence to public health.

The clinical and laboratory facilities of the Lemuel Shattuck Hospital are available to students of the School. This hospital was built by the Department of Public Health of the Commonwealth of Massachusetts for the treatment and rehabilitation of patients with chronic diseases. Since the average duration of hospitalization is usually longer than that in general hospitals, an opportunity is afforded to study chronic disease problems not encountered in general hospitals. The training program, consultant rounds and professional staff appointments are under the aegis of the Deans of Boston University, Harvard and Tufts University Medical Schools, as well as

the Harvard School of Public Health. Research laboratories at the Shattuck Hospital are engaged in studies of arthritis, hematology, pulmonary function, radioisotopes, cancer therapy and chronic renal and hepatic diseases.

LIBRARIES

The library needs of the School of Public Health are served principally by the Francis A. Countway Library of Medicine, which opened its doors to readers in June 1965. The Countway Library, located at 10 Shattuck Street, combines the resources and services of the Harvard Medical Library and the Boston Medical Library. Among libraries serving medical and health-related schools, it is the largest in the country. Its recorded holdings number 427,000 volumes, and it receives 5,200 periodicals annually. The Countway Library is open:

8:00 A.M. to 11:30 P.M. weekdays
9:00 A.M. to 5:00 P.M. Saturdays
2:00 P.M. to 11:30 P.M. Sundays

In addition to its holdings of current books and periodicals, the Countway Library has extensive collections of historical materials, dating from the 15th Century. Its History of Medicine Department provides modern facilities for the use of these books and other rarities.

For the convenience of the several departments of the School, collections of books and journals are maintained within those departments.

All members of the University may borrow from the College Library at Cambridge. Messenger service is provided daily between the College Library, various other Harvard University Libraries, and the Countway Library.

The Boston Public Library issues cards to permanent and to temporary residents of Boston. Others may obtain cards upon payment of a small fee. Other libraries of the Boston area, notably those of the Massachusetts Institute of Technology, add to the total book and periodical resources available to students.

Through the generosity of the Harvard School of Public Health,

The Countway Library of Medicine Periodical Room

Class of 1966, a typewriter is available in the Countway Library for the use of students.

The librarian of the Countway Library is Harold J. Bloomquist, and Dr. Jean Mayer represents the School of Public Health on the Library Committee.

HENRY LEE SHATTUCK INTERNATIONAL HOUSE

The Henry Lee Shattuck International House is maintained by the Harvard School of Public Health on a nonprofit basis as a residence for its students and their families from the United States and abroad. Located within walking distance of the School at 199, 203 and 207 Park Drive, the House comprises sixty-one individual apartments of one to four rooms, each with its own kitchenette, bath and foyer. The apartments are furnished with basic items except for linens, blankets, and kitchen utensils and are leased for the ten-month period September 1 through June 30. Included in the monthly rent are hot water, heat, janitor service and all utilities except telephone.

In addition, the Shattuck International House provides a playroom and an outdoor playground for the children, a laundry room, and a study room. There is also a modern Recreation Area for adults consisting of a library, music rooms, a large meeting room. and fully equipped kitchen. Here under the sponsorship of faculty and students are held informal gatherings and scheduled events, offering many opportunities for exchange of ideas and information about the culture, geography and social structure of the many countries represented in the House and the School.

The Shattuck International House was established in 1960 by the Faculty, alumni and friends of the School for students and their families, with the hope that it would serve as a dignified residence and a congenial center for recreational and cultural activities.

TWO

ADMISSION AND DEGREES

Application for Admission

Applicants must submit the following for consideration by the Committee on Admissions and Degrees: (1) completed application form; (2) transcripts of academic record at college, graduate school and/or professional school; (3) names of at least three people, well acquainted with the applicant's previous work, from whom the School may request letters of reference.

An application fee of $15, which is not refundable, is required for each formal application. A check drawn on a bank in the United States, a postal money order, or an international money order, payable to the Harvard School of Public Health, must accompany the application.

Applicants from countries in which the language of instruction is not English must satisfy the Committee as to their ability to speak, read, write and understand the English language competently. The applicant must have sufficient knowledge of English to enable him to understand lectures in English, to participate in seminar discussions and to write examinations. In the absence of sufficient evidence from the sponsoring agency and other sources, the School may request that the applicant take and pass satisfactorily the University of Michigan English Language Test. If, upon arrival at the School, a student's command of English is found to be inadequate, he may be required to take further instruction in English.

In addition to fulfilling the specific requirements for admission to a degree program, applicants must satisfy the Committee as to their ability to undertake advanced study at a graduate level. The final judgment as to the admissibility of an applicant rests with the Committee on Admissions and Degrees.

Preference will be given to applicants under 40 years of age; applicants over 45 years of age are considered for admission only under exceptional circumstances.

The School is unable to accept all who apply and are eligible for admission. Therefore, persons who wish to be considered for admission to the 1970–71 Class are urged to submit their applications by April 1, 1970. However, applications which are completed *by May 31, 1970*, will be considered, subject to availability of space.

Admission of a candidate for one academic year does not automatically admit him in a subsequent year; re-application is considered on the same basis as a new application.

All inquiries and communications regarding admission should be addressed to the Director of Admissions, Harvard School of Public Health, 55 Shattuck Street, Boston, Massachusetts, 02115.

Living Expenses

Living costs in the Boston area are higher than in most areas from which students come. Therefore, the school has adopted the policy stated below in regard to applicants for admission from outside the United States.

An applicant whose financial support is not guaranteed by an official U. S. agency or foundation must submit evidence satisfactory to the School that he will have sufficient funds available in U. S. currency to enable him to pay his expenses during the academic year. The minimum amount needed by a single person, in addition to travel, is $5,200, to cover the cost of tuition ($2,400) and living expenses of at least $300 a month for approximately nine months. If an applicant plans to bring his family, he must have at least $1,100 more for his wife and $500 for each dependent child, in addition to travel expense. Certification of adequate financial resources must be received by the School before the immigration form needed to obtain a visa to enter the U.S. can be issued to the student.

Courses of Study and Degrees

MASTER OF PUBLIC HEALTH DEGREE

Requirements for Admission

1. Applicants may be considered for admission as candidates for the Master of Public Health degree if they are graduates of approved schools of medicine or if they have similarly thorough preparation in the biological sciences.

2. Persons with these qualifications must satisfy the Committee on Admissions and Degrees as to their scholastic ability to study at a graduate level.

Requirements for the Degree

1. One academic year must be spent in residence at the University. The student must complete successfully a program of basic and elective courses to a minimum total of 40 credit units.

The first term of the Master of Public Health program empha-

sizes a core curriculum providing basic information in the sciences relevant to public health and an understanding of principles and methods. The second term is devoted largely to courses elected by the student in consultation with his Faculty adviser.

2. All candidates for the degree are required to take a *minimum* of 16 units from the following *Basic Core Curriculum*:

FALL TERM

Course	*Credit units*
Principles of Biostatistics (Biostatistics 1a,b)	3.5
Principles of Epidemiology (Epidemiology 1a,b)	2.5
Provision of Health Services and Medical Care (Health Services Administration and Maternal and Child Health 1a,b)	4
Principles of Environmental Health (Environmental Health Interdepartmental 1a,1b)	4
Ecology and Epidemiology of Infectious Diseases (Microbiology and Tropical Public Health 1a,b)	4
Introduction to Behavioral Sciences (Behavioral Sciences 1a,b)	2
Public Health Nutrition (Nutrition 1a)	1
Population Growth and Fertility Control (Demography and Human Ecology 1a)	1

SPRING TERM

History and Philosophy of Public Health (Interdepartmental Course 1.1c)	1

3. The balance of the Master of Public Health program in the spring term is devoted to elective courses, seminars and tutorial work, chosen by the student on the basis of his field of interest. These courses are described on pages 79–162. Certain courses in other graduate schools of Harvard University and in the Massachusetts Institute of Technology are open to full-time students in the Harvard School of Public Health.

4. No formal classes are scheduled during the one-week period between the Fall and Spring terms. This time is available to study

data processing in the Department of Biostatistics or for supervised special studies or field observations in other Departments. All candidates for the Master of Public Health degree are required to register for work during this week in Biostatistics 13e (Data Processing and Computer Programming), or in Course 17e (Tutorial) or Course 30e (Field Study), in other Departments. Opportunities available are listed under the various Departments. One unit of credit will be given for satisfactory completion of the week's assignment.

MASTER OF SCIENCE IN HYGIENE DEGREE

(With Designation of a Field of Concentration)

This degree is granted on fulfillment of a program of advanced work in one of the basic disciplines of public health. The courses taken must form an integrated plan of study in one branch of knowledge and allied subjects.

Requirements for Admission

1. Applicants may be considered for admission as candidates for the Master of Science in Hygiene degree, on the basis of a one-year or a two-year program, if they meet the requirements in one of the categories listed below.

2. Persons with these qualifications must satisfy the Committee on Admissions and Degrees and the department within which they choose to specialize as to their potentiality for successful study at a graduate level within the School.

One-year Program

1. Applicants who are graduates of approved schools of medicine or who have a thorough preparation of a similar nature in the biological sciences.

2. Applicants who have a doctoral degree from an approved school in a discipline related to public health.

3. Applicants in public health specialties (social workers, nurses, health educators, nutritionists) who have obtained a master's degree

with honor grades in their special fields and have had at least two years' acceptable experience in a public health activity.

4. Applicants in industrial hygiene, air pollution control, radiological health and public health engineering who meet certain requirements with respect to academic background and experience. Normally this includes receipt of a bachelor's degree with honor grades (including adequate undergraduate training in physics, biology, chemistry and mathematics) supplemented by at least two years of relevant professional experience in the chosen field of specialization.

Two-year Program

Applicants with a bachelor's degree obtained with honors in the natural sciences who wish to specialize in one of the laboratory sciences or statistics.

Under certain circumstances, a year of graduate work in another approved institution may be accepted as the first year of this program.

Requirements for the Degree

1. The student must spend a minimum of one year in residence at the University and must complete successfully a program of at least 40 credit units. Candidates in the two-year program must obtain at least 80 credit units.

2. All candidates for the degree are required to take Biostatistics 1a,b and Epidemiology 1a,b, unless they can demonstrate equivalent preparation. Candidates who do not have a background in medicine or biology are advised to take Physiology 3a,b, or a course in general biology elsewhere. The remainder of the program is devoted to courses which may be prescribed by the department of concentration and to elective courses in the primary and related fields of interest. These courses are described on pages 79–162. Courses offered by other Faculties of the University are also available.

3. No formal classes are scheduled during the one-week period between the Fall and Spring terms. This time is available to study data processing in the Department of Biostatistics and for super-

vised special studies or field observations. All candidates for the Master of Science in Hygiene degree are required to register for work during this week, under Biostatistics 13e (Data Processing and Computer Programming), Course 17e (Tutorial) or Course 30e (Field Study), given by their Department of concentration. Opportunities available are listed under the Departmental course offerings. One unit of credit is given for satisfactory completion of the week's assignment.

MASTER OF INDUSTRIAL HEALTH

A program of courses leading to a Master of Industrial Health degree is designed to meet the needs for postgraduate training in graduate training in the public health disciplines which are relevant to the development of preventive medical programs in industry. This degree program is usually taken as part of a two-year approved residency in occupational medicine.

Requirements for Admission

Candidates must be graduates of an approved school of medicine and must also satisfy the Committee on Admissions and Degrees as to their scholastic ability to study at a graduate level. Students from the United States must have completed an internship of at least twelve months in a hospital approved by the American Medical Association.

Requirements for the Degree

1. One academic year must be spent in residence at the University.
2. The student must complete successfully the required and elective courses to a minimum total of 40 credit units. All candidates for the degree are expected to take the following courses unless they can demonstrate equivalent preparation:

Course	*Credit units*
Principles of Biostatistics (Biostatistics 1a,b)	3.5
Principles of Epidemiology (Epidemiology 1a,b)	2.5
Principles of Environmental Health (Environmental Health Interdepartmental 1a,1b)	4

Course	*Credit units*
Radiation Protection (Environmental Health Sciences 11a,b)	4
Basic Problems in Occupational Health and Industrial Environments (Environmental Health Sciences 3c,d)	6
Total	20

In addition, the student may select courses from the general curriculum or do special work subject to approval of the Heads of the Departments of Environmental Health Sciences or Physiology.

3. No formal classes are scheduled during the one-week period between the Fall and Spring terms. This time is available to study data processing in the Department of Biostatistics or for supervised special studies or field observations. All candidates for the Master of Industrial Health degree are required to register for work during this week, under Biostatistics 13e (Data Processing and Computer Programming), Course 17e (Tutorial) or Course 30e (Field Study), given by their Department of concentration. Opportunities available are listed under the Departmental course offerings. One unit of credit will be given for satisfactory completion of the week's assignment.

DOCTOR OF PUBLIC HEALTH

For the degree of Doctor of Public Health the student must complete an approved program of independent and original investigation in a special field and must present the results of this research in an acceptable thesis.

Requirements for Admission

1. An applicant for admission to candidacy for this degree must be either (a) a graduate of an approved school of medicine, dental medicine or veterinary medicine, or (b) the holder of another doctoral degree in one of the basic sciences related to public health.

2. The applicant must hold the degree of Master of Public Health or its equivalent from an approved institution and must have dem-

onstrated potential ability to undertake original investigation in a special field.

3. Admission to doctoral candidacy is considered provisional until the candidate has passed the oral qualifying examination.

DOCTOR OF SCIENCE IN HYGIENE

(With Designation of a Field of Concentration)

This degree is granted on successful completion of a program of independent and original research in one of the basic disciplines of public health, and the presentation of this research in an acceptable thesis.

Requirements for Admission

Candidates for the degree of Doctor of Science in Hygiene must hold the degree of Master of Science in Hygiene or its equivalent and must indicate ability to undertake original investigation in a special field.

Admission to doctoral candidacy is considered provisional until the candidate has passed the oral qualifying examination.

REQUIREMENTS FOR DOCTORAL DEGREES

Residence

The student is required to complete a minimum of one academic year in residence. However, the required work and preparation of an acceptable thesis normally require at least two full years and frequently longer.

"Residence" requirements are fulfilled by payment of tuition and pursuit of an approved program. The first year is almost invariably in actual physical residence at the School. Subsequently, the thesis work may be continued at the School, or, in special circumstances, may be done *in absentia*. For thesis work done *in absentia*, the Adviser and the appointed evaluators must meet with the candidate to appraise the thesis plan. Agreement must be reached and the Committee on Admissions and Degrees must be advised in writing prior to the departure of the student as to:

(a) The acceptability and feasibility of the proposed thesis plan

(b) The timing and scope of periodic written reports which will be required of the student

(c) Arrangements which have been or can be made for direct field supervision of the student

(d) The minimum period of time the student will spend at the School prior to submitting his thesis for appraisal by the Readers; a minimum of four months is recommended.

Doctoral Program Adviser

After the student enrolls in the School as a provisional doctoral candidate, a Doctoral Program Adviser is appointed by the Department of concentration. This Adviser keeps the student informed of all procedures and requirements for the degree, advises him about proper courses to be taken; decides, together with the Department, when the student is prepared to take the qualifying examination, and supervises the thesis work.

Foreign Language Requirement

The student is required to demonstrate a knowledge of one of the following languages in addition to English: French, German, Spanish, Russian, Chinese or Japanese. With permission of the Department, the student may make a request to the Committee on Admissions and Degrees for substitution of another language for one of those listed. The justification for such a request should be in terms of the scientific importance of the alternative language in the student's particular discipline.

Satisfaction of the language requirement is evaluated by the Committee on Admissions and Degrees. The examination is scheduled by the Registrar on request of the student. The student should be urged to satisfy the requirement as soon as possible, and not later than two years after registration as a provisional doctoral candidate.

Qualifying Examination

The qualifying examination for admission to full doctoral candidacy consists of Part A and Part B.

Part A is administered by the Department of concentration, and consists of a thorough examination in the field of concentration and closely related areas. As many of the Departmental Faculty as possible should be involved in this examination. The examination may be written, oral, or both — at the discretion of the Department. On satisfactory completion of this part of the examination, the candidate is eligible to take Part B.

Management of Part B is the responsibility of the Committee on Admissions and Degrees. It is an oral examination in the field of concentration and at least two other relevant fields. In the field of concentration the examination focuses on the candidate's imaginative use of principles and ability to apply his knowledge, rather than his basic background of knowledge which has already been tested in Part A. The other fields of examination need not necessarily be related to the student's thesis topic; they are selected by the Department of concentration with approval of the Committee.

Both parts of the qualifying examination should normally be completed within one year of registration as a provisional doctoral candidate. Part A is scheduled by the Department and Part B by the Committee on Admissions and Degrees. Part B of the examination is open to all Faculty members; however, decision as to the outcome of the examination rests solely with the appointed examiners. The decision may be (a) pass, (b) general failure — requiring complete re-examination, or (c) specific failure — requiring re-examination only in the specified subject. Permission for re-examination rests with the Committee on Admissions and Degress, on the recommendation of the examiners.

Evaluation of Candidate's Progress

After the candidate has passed the qualifying examination, two Faculty members are appointed to aid the Adviser in the periodic evaluation of the student's progress.

Form of Thesis

The thesis should consist of one or more manuscripts suitable for publication in a scientific medium appropriate to the candidate's field. If the work is published prior to submission of the thesis,

copies of the publication may be submitted in lieu of manuscript. If not included in these documents, there should be added an introduction describing the historical setting and objectives of the work and a concise discussion that would provide an overall evaluation of its significance. Technical appendices should be added where necessary to demonstrate the full development of the thesis material.

Papers published under joint authorship are acceptable provided that the candidate has contributed a major part to the investigations. He is expected to be senior author on at least one of the papers. In the case of manuscripts published under joint authorship, the co-authors or the Adviser may be consulted by the Readers or the Committee on Admissions and Degrees to clarify the nature and extent of the candidate's contribution.

In addition to evaluating the quality and significance of the work, those responsible for accepting the thesis (the Department and the Readers) may determine whether the format is suitable for publication in a scientific medium appropriate to the candidate's field.

Evaluation of Thesis

The thesis must first be accepted by the Department of concentration. When it is, three unbound copies should be deposited in the Registrar's Office. On request of the Department, the Committee on Admissions and Degrees will appoint three or more Readers. When the Readers have individually evaluated the thesis, they will meet, together with one or more members of the Committee, and make a joint recommendation regarding acceptance of the thesis. If the thesis is accepted, the Committee on Admissions and Degrees may then recommend the candidate to the Faculty for the degree. The degree is voted by the Faculty at its special midyear or June meeting.

The Readers, as individuals or at their meeting, may call on the student for clarification, augmentation or defense of material presented in the thesis.

The unbound copies of the thesis must be in the Registrar's Office before *January first*, for degrees to be awarded at mid-year, and *before April fifteenth* for degrees to be awarded in June.

An acceptable thesis must be submitted within 5 years of the date of registration as a provisional doctoral candidate.

Final Seminar

There is no formal public thesis defense. However, after acceptance of the thesis by the Committee of Readers, the Department of concentration is responsible for the arrangement of a seminar at which the candidate will present and discuss his thesis work. These seminars are announced throughout the School, and are open to Faculty, research staff and students.

Grading System

All courses are graded as "Satisfactory" or "Unsatisfactory." *Satisfactory* indicates performance of sufficiently high quality for credit to be assigned. A grade of *Unsatisfactory* means that no credit is given for the course. If a student is graded as *Unsatisfactory*, the following procedure is to be followed:

(a) *Unsatisfactory* in courses required by the Faculty and the Department of concentration:*

The Committee on Admissions and Degrees, in consultation with the Instructor and the Faculty Adviser, decides whether or not the student may be given a re-examination;

(b) *Unsatisfactory* in courses not required for a particular degree:

No re-examination is given if the student has enough credits for the degree. A re-examination may be given, as under (a) above, if credit is needed for the degree. This decision must be made within eight weeks after the end of the course.

* A Department may require specific courses for students in a Master of Science in Hygiene, Master of Industrial Health, or doctoral program in addition to those required by the School for the particular degree. Such courses would be classified as "required" courses.

Residency Programs

The School offers approved residency training leading to certification by the American Board of Preventive Medicine in the following areas:

Occupational Medicine

General Preventive Medicine, in the specialty areas of
- Epidemiology
- International Health
- Health Services Administration

Residency programs are three years in length and consist of one or two years of study leading to the graduate degree, Master of Public Health, or Master of Science in Hygiene, and one or two years of more advanced work including supervised experience which may or may not be part of a doctoral program. The third year may be devoted to training in an approved industry, organization, or institution consistent with the specialty area.

Further details on the residency programs, including availability of financial support, can be obtained through the Director of Admissions.

Special Students

Subject to availability of space, the School may accept a few students, on a full-time or a part-time basis, who are not degree candidates, but who are interested in taking one or more courses in a special field. Procedures and requirements for the admission of such students are the same as for degree candidates. Special students who later wish to be admitted to degree candidacy will be considered on the same basis as other applicants for admission. Admission as a special student carries with it no commitment to accept the applicant as a degree candidate.

Degrees in Engineering

Graduates of engineering colleges or scientific schools of recognized standing who are interested in environmental engineering may be admitted to the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences as candidates for the degree of Master of Science or Doctor of Philosophy. They may elect appropriate courses in the School of Public Health as a part of the program for these degrees.

For further information write to the Committee on Admissions, Graduate School of Arts and Sciences, Holyoke Center, 75 Mt. Auburn Street, Cambridge, Massachusetts, 02138.

THREE
CENTERS

The Kresge Center for Environmental Health

James L. Whittenberger, S.B., M.D., A.M., (hon.), Director
Dade W. Moeller, S.B., S.M., Ph.D., Associate Director

This Center is based primarily at the School of Public Health and includes research and educational programs of the Departments of Environmental Health Sciences, Physiology, and Sanitary Engineering, and environmental health-related activities in other parts of the University.

Cutting across administrative boundaries are interdisciplinary programs in several of the component fields of environmental health; these currently include the following:

1. Aerospace Health and Safety
2. Air Pollution Effects and Control
3. Environmental Physiology
4. Environmental Toxicology
5. Human Factors — Accident Prevention
6. Industrial Hygiene
7. Occupational Medicine
8. Radiological Health
9. Respiratory Physiology
10. Sanitary Engineering
11. Solid Waste Disposal
12. Water and Soil Chemistry
13. Water Resource Engineering

In addition to these programs, the Center encourages the development of individual plans of study which extend to other parts of Harvard University where courses have relevance to environmental health; for example, in city and regional planning and public administration. The Center also promotes the development of seminar courses which cross disciplinary boundaries.

Several degree programs are available in environmental health;

the formal requirements are described in other sections of the catalogue. In general, students interested in problems of water quality and water resources enroll for a Master of Science or Ph.D. program in the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences in Cambridge.

Students interested in such fields as air quality, industrial hygiene, radiological health, and toxicology ordinarily enroll in a Master of Science in Hygiene or Doctor of Science in Hygiene program at the School of Public Health. Physicians are eligible for any of the degrees offered by the School of Public Health.

Additional information is given in the departmental and course listings. Applicants are also encouraged to write for supplements of the catalogue which describe these programs in greater detail.

On May 14, 1968, Dr. Clyde W. Berry, President of the American Industrial Hygiene Association, presented a plaque to the Harvard School of Public Health in commemoration of "50 years of dedicated leadership, teaching and research in industrial hygiene and environmental health." Shown above receiving the plaque on behalf of the School is Professor James L. Whittenberger, Associate Dean for Academic Affairs.

Center for the Prevention of Infectious Diseases

Thomas H. Weller, A.B., S.M., M.D., LL.D., Director

The Center for the Prevention of Infectious Diseases is comprised of the Departments of Microbiology and of Tropical Public Health. Working in close collaboration, the staffs of the two Departments are concerned with the broad spectrum of agents, i.e., viral, rickettsial, bacterial, mycotic, protozoal, and helminthic entities, that parasitize man and with their relevant arthropod and molluscan vectors.

On a global basis the infectious diseases remain a primary cause of mortality. In the developed areas of the world, morbidity attributable to infectious diseases persists as a major impediment to the enjoyment of complete health. An increasing number of chronic degenerative diseases are recognized as stemming from the insults of prior-infectious processes. In many societies, acceptance of the concept of population control awaits containment of undue mortality induced by the infectious diseases and the consequent assurance that children who are born will have a reasonable prospect of achieving maturity. Considerations such as the foregoing emphasize the continuing need for the public health expert to possess knowledge of the rapidly changing technology of the control of infectious diseases, as well as a basic knowledge concerning the attributes and epidemiologic characteristics of the responsible agents.

The Faculty of the Center for the Prevention of Infectious Diseases operates in close collaboration to discharge a common responsibility for multidisciplinary instruction in the various facets of diseases of infectious etiology. The formal course offerings of the two Departments are designed and scheduled to permit the acquisition of a broad basic knowledge of infectious diseases as well as an introduction to specialized subject areas. For advanced

qualified students, concentration in specific areas with participation in collaborative or individual research is encouraged both at the pre-doctoral and the post-doctoral levels. The wide variety of current research projects in the Center permits acquisition of experience both at home and abroad, in the laboratory or in the field. Training grant funds are available for the support of qualified individuals specifically interested in public health bacteriology, rickettsiology, virology, mycology, parasitology, and tropical medicine.

Center for Population Studies

Roger Revelle, A.B., Ph.D., S.D. (hon.), A.M. (hon.), L.H.D., Richard Saltonstall Professor of Population Policy and Director of the Center
Joseph D. Beasley, A.B., M.D., D.T.M.&H., M.P.H., Professor of Population and Public Health and Medical Director of the Center

Arthur J. Dyck, A.B., A.M., PH.D., Member of the Center for Population Studies; Mary B. Saltonstall Professor of Population Ethics; *Member of the Faculty of Harvard Divinity School*

Roy O. Greep, S.B., S.M., PH.D., A.M. (hon.), S.D. (hon.), John Rock Professor of Population Studies; *Director of the Laboratory of Human Reproduction and Reproductive Biology, Harvard Medical School*

Hilton A. Salhanick, A.B., A.M., PH.D., M.D., Member of the Center for Population Studies; *Professor of Obstetrics and Gynecology, Harvard Medical School*

Harold A. Thomas, Jr., S.B., S.M., S.D., Member of the Center for Population Studies; *Gordon McKay Professor of Civil and Sanitary Engineering*

Harvey Leibenstein, S.B., A.M., PH.D., Member of the Center for Population Studies; *Andelot Professor of Economics and Population, Department of Economics, Harvard University*

Russell G. Davis, A.B., ED.M., ED.D., Member of the Center for Population Studies; *Professor of Education and Development, Harvard Graduate School of Education*

Robert Dorfman, A.B., A.M., PH.D., A.M. (hon.), Member of the Center for Population Studies; *Professor of Economics, Department of Economics, Harvard University, Member of the Faculty of the School of Government*

Gino Germani, LIC-EN-PHIL, Member of the Center for Population Studies; *Monroe Gutman Professor of Latin American Affairs, Department of Social Relations, Harvard University*

Jean Mayer, B.A., B.SC., M.SC., PH.D., D.SC., A.M. (hon.), Member of the Center for Population studies; *Professor of Nutrition and Lecturer on the History of Public Health*

Ralph B. Potter, Jr., A.B., B.D., TH.D., Member of the Center for Population Studies; *Professor of Social Ethics, Harvard Divinity School*

David M. Heer, A.B., A.M., PH.D., Associate Professor of Demography

Dieter Koch-Weser, M.D., S.M., PH.D., Associate Professor of Tropical Public

Health; *Associate Dean for International Programs, Harvard Medical School*

JOHN B. WYON, B.A., M.B., B.CH., M.P.H., Senior Research Associate and Lecturer on Population Studies

STEPHEN J. PLANK, PH.B., A.B., M.D., M.P.H., DR.P.H., Lecturer on Population Studies

HELEN D. COHN, M.P.H., Instructor in Applied Public Health Nursing; *Associate Professor of Public Health Nursing, Boston University School of Nursing*

ALBERT DAMON, A.B., PH.D., M.D., Member of the Center for Population Studies; *Senior Research Associate in Medical Anthropology, Peabody Museum, Lecturer on Anthropology, Harvard University*

HELEN GIDEON, M.B., B.S., M.P.H., Research Associate in Population Studies

*CARL J. BAJEMA, S.B., A.M., PH.D., Research Associate in Population Studies

*GRETCHEN M. BERGGREN, A.B., M.D., S.M. IN HYG., Research Associate in Demography and Human Ecology; *Assistant to the Director, Community Health Program, Hôpital Albert Schweitzer, Haiti*

*ROSE E. FRISCH, A.B., A.M., PH.D., Research Associate in Population Studies

MARIA L. MILANESI, M.D., Research Associate in Population Studies

CHARLES NEAVE, A.B., M.D., M.P.H., DR.P.H., Research Associate in Population Studies

PETER P. ROGERS, B.ENG., S.M., PH.D., Research Associate in Population Studies; *Assistant Professor of Environmental Engineering, Division of Engineering and Applied Physics, Harvard University, Assistant Professor of City Planning, Graduate School of Design*

*CONSTANTINA SAFILIOS-ROTHSCHILD, S.M., PH.D., Research Associate in Population Studies

VYTAUTAS I. UZGIRIS, A.B., S.B., M.D., PH.D., Research Associate in Population Studies

M. JEAN WALLACE, S.B., PH.D., Research Associate in Population Studies

CARMEN A. WHIPPLE, B.S., M.A., PH.D., Research Associate in Population Studies

BASIM F. MUSALLAM, B.A., M.D., Research Fellow in Population Studies

PAULINE S. WYCKOFF, A.B., Executive Secretary of the Center for Population Studies and Administrative Assistant to the Dean

WILMA E. WINTERS, S.B. IN ED., A.M., S.M., Librarian of the Center for Population Studies

The Center for Population Studies was established in 1964 under the leadership of the School of Public Health as a University-wide Center to help scholars and scientists in different fields join in a

common attack on human population problems. The Members of the Center are concerned with teaching and research on the history, dynamics, and means of control of human population changes; the physiology of reproduction; the psychology and sociology of human fertility; interactions between resource development and population growth; questions of economics, health, nutrition, education, and moral values related to population problems; and the physical and social environments of human populations.

A Faculty Advisory Committee guides the operation and development of the Center. Seven of the Faculties of Harvard University are represented on this Committee: Arts and Sciences, Design, Divinity, Education, Medicine, Government, and Public Health. The Faculty of the Center includes members of the Departments of Anthropology, Economics, and Social Relations, the Division of Engineering and Applied Physics, and the Schools of Public Health, Medicine, and Divinity. Two headquarters are maintained, one in Boston in the School of Public Health, and one in Cambridge.

In the School of Public Health, the Department of Demography and Human Ecology, as an integral part of the Center for Population Studies, conducts a program of research and teaching on public health aspects of population problems. The Department welcomes qualified candidates for the various degrees offered by the School of Public Health who wish to concentrate on these problems. Elsewhere in the University, courses and seminars open to all qualified students are given by Members of the Center in the Departments of Economics and Social Relations, in the Medical School, and the Divinity School.

At present, the Center is supporting pre- and post-doctoral research in demography, public health and fertility control, human reproductive physiology, religious attitudes toward fertility control, relations between population growth and economic and social development, and the sociological problems related to changes in human fertility patterns. Several broad research projects are in progress, both in the United States and overseas, and these provide further opportunities for graduate, post-doctoral, and faculty research.

Center for Community Health and Medical Care

Paul M. Densen, S.D., Director

The Harvard Medical School and School of Public Health established the Center for Community Health and Medical Care to serve as a University-wide focus of research and development of new educational approaches relevant to the organization and delivery of health services. The widening gap between growth of knowledge in the health sciences and capabilities of the system for delivering health services to the American people has become a matter of national concern. The Center is an expression of Harvard's determination to contribute to the nation's effort to facilitate and improve the application of the biomedical sciences toward the improvement of health of the peoples of this country and other countries of the world.

The Director, together with the Dean and the Associate Dean for Hospital Programs of the Medical School, and the Dean and the Head of the Department of Health Services Administration of the School of Public Health constitute the executive committee of the Center. Members of the Center are drawn from all Faculties of the University in which there is an active interest in health and health care services.

The interdisciplinary staff and faculty members of the Center are concerned with the design of experimental programs as well as the study of existing arrangements, mechanisms, organizations, institutions and related personnel involved in health care.

The Program of the Center includes:

1. Research in the organization and delivery of health services; and

2. Fellowship programs in medicine and public health designed to prepare professionals with the capabilities to design, plan, manage and evaluate the instrumentalities and the systems for the delivery of health services.

By its involvement of several Faculties of the University and by its programs for young physicians and other professionals, the Center provides a focus for the health activities of Harvard which are broadly directed toward the improvement of health services and medical care.


TAS

<< President Pusey in the academic procession on Commencement Day

FOUR

DEPARTMENTS AND CONTENT OF COURSES

Interdepartmental Courses

Interdepartmental Course. 1.1c. History and Philosophy of Public Health

Lectures. *One two-hour session each week, third period.* Dr. Mayer.

Credit 1 unit.

Recommended as part of basic core curriculum for Master of Public Health candidates.

The course has two major purposes: to help the student of public health gain a picture of the development of his profession, and to use selected historical situations to illustrate how scientific knowledge has interacted in the past with political structure, economic status and cultural attitudes in the determination of the health goals of various societies and the execution of programs. In this light, the development of the science and practice of medicine, sanitary engineering and demography in Ancient Egypt, Greece and Alexandria, Rome, the Arab and European Middle Ages and the Renaissance is broadly sketched. The birth of the concept of a National Health Policy is traced to the Ages of Mercantilism and Enlightenment. The Sanitary Movement and its relation to the Industrial Revolution is examined with particular reference to Britain, France and the United States. An attempt is made to evaluate the extent to which the lessons of history have been used in the formulation of health policies in a changing world, both in industrial and in developing nations.

Finally, the broad concept of health utopias, the ideal state of medicine and health as envisaged by various cultures, are examined both in historical and in geographical perspectives.

Interdepartmental Course 3c,d. Seminar on Teaching of Preventive Medicine and Public Health

Seminars. *Two two-hour sessions each week, third and fourth periods.* Dr. Segall.

Credit 4 units.

The seminars are designed for students who are preparing for careers as teachers of preventive medicine and public health or as administrators of teaching programs. Formulation of educational policy for medical school and community-based public health teaching programs is discussed. Educational objectives as well as methods for implementing and evaluating instructional programs are stressed. Each student designs curriculum in an area of interest.

Enrollment is limited and is subject to the approval of the Instructor.

Interdepartmental Course 17c,d. Tutorial Program in Teaching of Preventive Medicine and Public Health

Time and credit to be arranged. Dr. SEGALL.

An opportunity for tutorial work in curriculum design, development of methods of instruction and evaluation and other areas related to teaching preventive medicine and public health will be given interested students.

Prerequisite: Enrollment in Interdepartmental Course 3c,d.

Department of Behavioral Sciences

Alexander H. Leighton, A.B., A.M., M.D., Professor of Social Psychiatry *and* Head of the Department

*Charles M. J. Mertens de Wilmars, M.D., lic. en psych., *Visiting Professor of Psychiatry; Professor of Medical Psychology, Faculty of Medicine, Catholic University of Louvain, Belgium*

Sydney H. Croog, A.B., A.M., PH.D., Associate Professor of Sociology

Jane M. Murphy, A.B., PH.D., Associate professor of Anthropology

Morton Beiser, M.D., Assistant Professor of Social Psychiatry

Robert C. Benfari, A.B., A.M., PH.D., S.M. in HYG., Assistant Professor of Psychology

David S. Shapiro, A.B., PH.D., Lecturer on Social Psychiatry

Robert A. Danley, A.B., S.M., PH.D., Research Associate in Sociology

*A. Philip Connelly, Jr., A.B., M.D., Research Associate in Medicine; *Chief of Medicine, Cardinal Cushing Hospital, Brockton*

*Alice L. Nangeroni, A.B., Research Associate in Behavioral Sciences; *Assistant to the Chairman, Department of Sociology, Cornell University*

Victor G. Cardoza, Field Project Administrator

Joseph C. Kern, A.B., Assistant in Behavioral Sciences

Amorita C. Suarez, S.B., Assistant in Behavioral Sciences

*Roderick A. Armstrong, B.A., L.M., S.S.A., Research Consultant on Social Psychiatry; *Executive Director, Digby-Annapolis Mental Health Service Board, Inc.*

*Jean-Noel Fortin, B.A., M.A., M.D., Consultant on Psychiatry; *Associate Professor of Psychiatry, University of Montreal*

*John S. Harding, A.B., A.M., PH.D., Research Consultant on Psychology; *Professor, Department of Child Development and Family Relationships, Cornell University*

*Daniel J. O'Connell, M.D., Consultant on Psychiatry; *Executive Secretary, Association of American Indian Affairs*

The Department of Behavioral Sciences has a primary concern with the relationship of social and cultural factors to mental health and mental illness.

* Part-time in the School of Public Health.

Allied to this is an interest in the way social, cultural, and psychological factors affect the development and effectiveness of planned changes, particularly those involving public health programs.

Students have the opportunity to study psychiatric epidemiology, cross-cultural psychiatry, the characteristics of community services, medical sociology, and the role of cultural factors in health and disease. Because of its crucial importance to all aspects of public health, special attention is given to studying factors which affect program acceptance — why people accept or reject certain public health programs. Throughout the curriculum considerable emphasis is given to research and research methodology.

The Department's teaching plan is therefore geared both to the student who has a social science background and wishes to know more about mental health and illness, and to the student who has a clinical orientation and wishes to know more about the social, cultural, and psychological influences which shape the human community. To supplement Departmental and School resources to achieve this end, the student may take additional courses in other parts of Harvard University such as the Department of Psychiatry and the Department of Social Relations.

The current research of the Department is focused on longitudinal community studies of mental health and mental illness, comparative psychiatric epidemiology, the effects of social and cultural change, the adjustment and adaptive processes of individuals and families after severe illness, the evaluation of psychiatric preventive measures, and the effects of intervention. In addition to being concerned with causal relationships and the building of significant theory, Departmental members give major weight to the development of methods, the revision of concepts, and the testing of reliability and validity of mental health survey techniques. Doctoral candidates and fellows have the opportunity of sharing in these studies as team members, and also of selecting a segment for independent investigation.

Behavioral Sciences 1a,b. Introduction to Behavioral Sciences

Lectures. *One two-hour session each week, first and second periods.* Dr. Leighton and Staff of the Department.

Credit 2 units.

Recommended as part of basic core curriculum for Master of Public Health candidates.

The behavioral sciences, encompassing such disciplines as sociology, anthropology, psychology, and psychiatry, are highly relevant to many areas of public health practice, programing, and research. It is obviously impossible to present even a cursory review of all pertinent behavioral science subject matter; therefore, material for this course is selected on the basis of its relevance to public health in general. The course also provides the

required background for advanced courses given by the Departments of Behavioral Sciences, Health Services Administration, and Maternal and Child Health. The approach is illustrative rather than encyclopedic and covers a range of subjects — from such matters as brain function, learning and perception, to the behavior of human groups.

The first of three aims of this course is to survey the present state of social science concepts, theories and methods of research. The second aim is to highlight information, theories, and methods of practical application of the behavioral sciences that will be of use to the policy-maker, the planner, and the teacher. This means attention to the patterning and functioning of health agencies, the factors that influence the acceptance or rejection of public health programs, and the special issues characteristic of poverty and situations of cultural contrast and change. The third area of emphasis is social psychiatry. This new and expanding public health field is examined with particular reference to the prevalence of psychiatric disorders, their social causes, and preventive measures.

Behavioral Sciences 2b,c,d. Departmental Seminar

Seminars. *One two-hour session each week, second, third and fourth periods.* Dr. Leighton and Staff of the Department.

Credit 3 units.

The Departmental Seminar is a supplement to 1a,b. It provides a discussion group and additional selected readings for those students who wish to expand their studies of the behavioral sciences.

Behavioral Sciences 3b. Assessment of Mental Health

Laboratory. *One two-hour session and two hours of laboratory work to be arranged each week, second period.* Dr. Beiser and Staff of the Department.

Credit 2 units.

This course is concerned with training in a systematic technique for making psychiatric health ratings of individuals. It provides an opportunity to acquire skill in a type of procedure that is fundamental to making surveys of communities. It also gives first-hand experience with some new ways of viewing mental illness that are emerging from social psychiatry.

Prerequisite: Two years of training in Psychiatry or a degree in Clinical Psychology.

Enrollment is subject to the approval of the Instructor.

Behavioral Sciences 4c. Epidemiology of Psychiatric Disorders

Seminars. *One two-hour session each week, third period.* Dr. Leighton.

Credit 1 unit.

This course reviews present knowledge regarding the prevalence and in-

cidence of psychiatric disorders with particular attention being paid to etiological questions and the problems of control. Attention is focused on main categories of disorders, such as psychosis, neurosis, brain syndrome, and mental deficiency. Particular emphasis is given to matters of conceptualization and methods which confront the advance of research in this field.

Behavioral Sciences 6d. Cross-Cultural Psychiatry

Lectures and Seminars. *One two-hour session each week, fourth period.* Dr. MURPHY.

Credit 1 unit.

This course is designed for public health workers who desire to increase their knowledge regarding mental health and mental illness in contrasting cultural groups. The ground covered includes cultural relativity, cross-cultural epidemiology of psychiatric disorders, and the effects of rapid cultural change, poverty, and sociocultural disintegration. Indigenous practices for the treatment of the mentally ill in non-Western societies are described and their implications discussed. Various contemporary experiments concerned with meeting the psychiatric needs of developing countries are examined.

Admission is subject to the approval of the Instructor.

Behavioral Sciences 7c,d. Critical Issues in Community Psychiatry

Seminars. *One two-hour session and two hours of field work each week, third and fourth periods.* Dr. BEISER and Dr. SHAPIRO.

Credit 3 units.

This series of sixteen seminars deals with the development of the community mental health movement in its relationship to psychiatry, public health, and social welfare. The prevention of psychiatric disorder is given special attention as representing a crucial social issue of general concern. Preventive programs, both past and present, are critically examined. In addition, students are given individual reading assignments.

Field work entails observing and reporting on ongoing and projected programs for the prevention of mental illness at local and state levels. Planning of research will be encouraged.

Behavioral Sciences 8c,d. Health and Illness in Cross-Cultural Perspective

Lectures and discussions. *One two-hour session each week, third and fourth periods.* Dr. MURPHY and Staff of the Department.

Credit 2 units.

Sociocultural factors bear numerous kinds of relationships to physical and mental illness. This course is designed for public health and social science

students who seek greater understanding of these relationships. Attention will be given to different cultural definitions of the health-illness continuum and of the meaning of physical pain, intra-psychic disturbance, and social maladjustment. A selection of concepts from the social sciences will be reviewed in terms of their relevance to the origin and outcome of illness patterns. These include role, family, social class, cultural change, and community functioning. Case materials and research examples draw upon studies of non-Western groups and ethnic sub-groups within Euro-American society.

Enrollment is subject to the approval of the Instructor.

Behavioral Sciences 9c. Sociological Functioning of Health Agencies

Seminars. *One two-hour session each week, third period.* Dr. Croog.

Credit 1 unit.

This course offers a comparative sociological review of the structure and function of major types of organizations involved in the provision of health services and programs, including the general hospital, mental hospital, local health department, and state and federal health services. It includes the analysis of major ways in which elements of the organization may promote or impede the achievement of goals. Attention is given to varying modes of administrative management, motivations of personnel, systems of control, problems in acquiring resources, and patterns of inter-agency relationships.

Behavioral Sciences 10d. Inducing Social Change

Seminars. *One two-hour session each week, fourth period.* Dr. Mertens and Staff of the Department.

Credit 1 unit.

This course is designed for various specialists in public health who are charged with responsibility for introducing changes in organizations and communities. The subject matter includes methods and theories of teaching, principles of individual and group psychotherapy, approaches to sensitivity training and group dynamics, and organizational theory. Techniques and procedures illustrating these theories are presented. The general aim of familiarizing students with existing theories and techniques of inducing social changes is pursued through readings, discussions, and case illustrations.

Behavioral Sciences 11d. Training in Mental Health Counseling

Seminars and laboratory. *One two-hour session and two hours to be arranged each week, fourth period.* Dr. Shapiro.

Credit 2 units.

This course is concerned with providing training in mental health counseling. It presents standardized techniques of case management, counseling, and referral, which may be incorporated into the practices of physicians, clergymen, public health nurses, social welfare workers, and others. Much of the course is conducted with case studies. Special consideration is given to techniques of organizing and evaluating mental health training programs.

Enrollment is subject to the approval of the Instructor.

Behavioral Sciences 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged. Staff of the Department.

Arrangements can be made for a reading course in selected topics or practical experience in research.

Behavioral Sciences 20a,b,c,d. Research Training

Training in research is available to doctoral candidates through individual arrangements with the Staff of the Department.

Behavioral Sciences 30e. Field Study

A limited number of openings exist for research experience in the Department's field stations. These opportunities vary in nature from time to time according to the stages of various research projects. Individual arrangements can be made through the Head of the Department.

Department of Biostatistics

Robert B. Reed, A.B., A.M., PH.D., A.M. (hon.), Professor of Biostatistics *and* Head of the Department

Jane Worcester, A.B., DR.P.H., S.D. (hon.), Professor of Biostatistics and Epidemiology

Jacob J. Feldman, PH.D., Associate Professor of Biostatistics

*Todd M. Frazier, A.B., S.M., Associate Professor of Biostatistics; *Assistant Director, Center for Community Health and Medical Care, Harvard Medical School and Harvard School of Public Health*

Olli S. Miettinen, M.D., M.P.H., M.SC., PH.D., Associate Professor of Epidemiology and Biostatistics.

*Yvonne M. M. Bishop, B.A., S.M. IN HYG., PH.D.; Assistant Professor of Applied Biostatistics; *Statistician to the Children's Cancer Research Foundation*

Margaret E. Drolette, A.B., M.P.H., PH.D., Assistant Professor of Biostatistics

James H. Warram, Jr., S.B., M.D., S.M. IN HYG., Assistant Professor of Biostatistics

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Ellen W. Jones, A.B., M.P.H., *Principal Associate in the Center for Community Health and Medical Care* (*Statistician*)

The teaching aims of the Department may be divided very generally into three categories:

First, it is essential for workers in all branches of public health to be able to draw justified conclusions from numerical data and to base logical action on these conclusions. This applies to the administrator who must evaluate problems and the results of his activities, as well as to the epidemiologist and the research worker who must apply statistical techniques to their laboratory and field problems. The required course in Biostatistics is therefore designed to give a minimum command of simple statistical methodology to all students.

Second, it is essential for field and laboratory researchers to be able to use statistical methods in planning and analyzing their experiments and problems. Elective courses are designed to provide an introduction to methodology in this area. These courses are adapted to the needs of students of this School, many of whom have broad backgrounds in biological sciences while few have extensive preparation in mathematics. A minimum of mathematical exposition is therefore included in courses intended for students in these categories. Instead the emphasis is on understanding the statistical procedures and the ability to carry out indicated analyses effectively.

* Part-time in the School of Public Health.

Third, there is a smaller group of students particularly interested in pursuing further work along mathematical lines. Their requirements are fulfilled, on the one hand, by the provision of advanced and seminar courses in the Department; on the other, by the offerings of the Department of Statistics in the Graduate School of Arts and Sciences.

Training in the use of data processing equipment is available in the Data Processing Center operated by the Department. This Center is equipped with an IBM 1620 Computer and basic punch card machines. The University Computer Center, located in Cambridge and equipped with IBM 7094 and 360 Computers, also provides an opportunity to study computer techniques. A teletype connection of the time-sharing system at the Computing Center is available for students at the School.

Any course in the Department is open to any student who meets the prerequisites stated in the course description.

Biostatistics 1a,b. Principles of Biostatistics

Lectures. *Two one-hour sessions each week, first and second periods.*

Laboratory. *One three-hour session each week, first and second periods.* Staff of the Department.

Credit 3.5 units.

Recommended as part of basic core curriculum for Master of Public Health candidates. Required of Master of Science in Hygiene candidates.

Lectures and laboratory exercises introduce the student to demographic concepts: the structure of the population and the use of the life table; the nature and composition of rates and their use from administrative and epidemiological points of view. The course forms an introduction to the theory of measurements and distributions, including the testing of significance of differences and the interaction of variables. Finally, the student is introduced to basic concepts of probability and association, sampling techniques and construction of controlled experiments such as clinical trials.

Biostatistics and Epidemiology 2b,c,d. Design of Investigations

Seminars. *One two-hour session each week, second, third and fourth periods.* Dr. MacMahon.

Credit 3 units.

This course is for students with a major interest in epidemiology or biostatistics. Participants select a problem in apparent need of investigation, and prepare and present for group discussion a summary of the present status of knowledge of the problem and the design of a study directed towards advancement of present knowledge.

Enrollment is subject to the approval of the Instructor.

Biostatistics 3c,d. Statistical Methods in Research

Lectures, discussions and laboratory. *Two three-hour sessions each week, third and fourth periods.* Dr. Reed, Dr. Worcester and Dr. Drolette.

Credit 4 units.

This course, a continuation of Biostatistics 1a,b, introduces the student to technical statistical procedures important in problems of laboratory and field research. Topics included are further considerations of probability and correlation, together with an introduction to procedures used in the planning of experiments, including variance analysis, non-parametric methods, dosage response and maximum likelihood.

Prerequisites: Basic preparation in statistics and epidemiology.

Biostatistics 4c,d. Mathematical Foundations of Biostatistics

Lectures. *One two-hour session each week, third and fourth periods. Time to be arranged.* Dr. Drolette.

Credit 2 units.

The material covered includes mathematical descriptions of commonly used distributions, standard procedures for estimating the moments of a distribution and mathematical foundations of statistical inference, including the Neyman-Pearson lemma, the likelihood ratio, the central limit theorem and power.

Prerequisite: A course in elementary calculus.

Biostatistics 5c. Survey Research Methods in Community Health

Lectures and discussions. *Two two-hour sessions each week, third period.* Dr. Feldman.

Credit 2 units.

Research design, sample selection, questionnaire construction, interviewing techniques, the reduction and interpretation of data, and related facets of population survey investigations are covered in this lecture and reading course. The course is focused primarily on the application of survey methods to problems of health program planning and evaluation. The treatment of methodology is sufficiently broad so as to be suitable also for students who are concerned with applications to epidemiological, nutritional or other types of survey research.

Biostatistics and Epidemiology 6c,d. Research Methods in Epidemiology

Lectures. *One two-hour session each week, third and fourth periods.* Dr. Worcester and Staffs of the Departments of Biostatistics and Epidemiology.

Credit 2 units.

Primarily for Master of Science in Hygiene and doctoral candidates in Epidemiology or Biostatistics.

This course is concerned with statistical and other problems commonly encountered in epidemiologic research. Examples include assessment of data quality, misclassification, nonresponse, population sampling, matching, and analytic techniques for birth order effects, time-space clusters, cyclical variations, and measurement of survival.

Prerequisite: Enrollment in Biostatistics 3c,d.

Enrollment is subject to the approval of the Instructor.

Biostatistics 10a,b. Advanced Topics in Biostatistics

Seminar. *One two-hour session each week, first and second periods.* Dr. DROLETTE.

Credit 2 units.

The subject matter of this course varies from year to year. During the fall of 1969 the course will focus upon methods for measuring survival over time. Topics to be discussed will include life table methods, stochastic models which have been proposed in this area, methods for estimating the parameters of such models and the appraisal of goodness of fit.

The course is intended primarily for students specializing in Biostatistics. Other students may be admitted by obtaining the consent of the Instructor.

During the year 1970–71, Biostatistics 10a,b will deal with methods of factor analysis.

Biostatistics 11a,b,c,d. Teaching of Biostatistics

Time and credit to be arranged. Staff of the Department.

This course is primarily used for students majoring in Biostatistics who act as laboratory instructors in Biostatistics 1a,b as part of their training. It may also be used for other teaching experiences.

Biostatistics 12a,b,c,d. Biostatistical Consultation

Time and credit to be arranged. Staff of the Department.

This course provides an opportunity for students majoring in Biostatistics to participate in the consulting work carried on by the Department faculty.

Biostatistics 13e. Introduction to Data Processing and Computer Programming

One full week is offered twice a year, January 26–31, 1970 or June 1–6, 1970. Staff of the Department.

Lecture and laboratory exercises provide an opportunity to learn fundamental procedures in the processing of data with computers. The facilities of the School's Data Processing Center and time-shared computer systems are used in the laboratory exercises.

Biostatistics 15a,b,c,d. Advanced Data Processing

Individual work may be arranged to suit the need of the student. Staff of the Data Processing Center.

Prerequisite: Biostatistics 13 or equivalent.

Biostatistics and Health Services Administration 16d. Health Program Evaluation

Seminars. *One two-hour session each week, fourth period.* Dr. DENSEN, Dr. FELDMAN, Mr. FRAZIER and Dr. REED.

Credit 1 unit.

This seminar is designed for students interested in the evaluation of ongoing health programs. Groups of students present for discussion their review of program evaluation methods used to assess the effectiveness of operating health programs.

Biostatistics 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged. Staff of the Department.

An opportunity for tutorial work at master's level is given interested students. This involves not only work in statistical fields, but can include problems arising in the course of special programs in other departments. Schedules and credit may therefore be arranged jointly with such other departments.

Biostatistics 20. Research

Candidates for the Doctor of Public Health, Doctor of Science in Hygiene, or other doctoral degrees may arrange for individual research. The work may be part of the program for a doctorate in this Department or may be integrated with doctoral research in other departments.

Students may register for Biostatistics 11, Biostatistics 12, Biostatistics 15, Biostatistics 17 or Biostatistics 20 for a maximum of 6 credit units in the summer term.

Department of Demography and Human Ecology

Joseph D. Beasley, A.B., M.D., D.T.M.&H., M.P.H., Professor of Population and Public Health and Head of the Department; Medical Director, Center for Population Studies

Arthur J. Dyck, A.B., A.M., PH.D., Mary B. Saltonstall Professor of Population Ethics; Member of the Center for Population Studies; *Member of the Faculty of the Harvard Divinity School*

Roy O. Greep, S.B., S.M., PH.D., A.M. (hon.) S.D. (hon.), John Rock Professor of Population Studies; *Director of the Laboratory of Human Reproduction and Reproductive Biology, Harvard Medical School*

Roger Revelle, A.B., PH.D., S.D. (hon.), A.M. (hon.), L.H.D., Richard Saltonstall Professor of Population Policy and Director of the Center for Population Studies.

Hilton A. Salhanick, A.B., A.M., PH.D., M.D., Member of the Center for Population Studies; *Professor of Obstetrics and Gynecology, Harvard Medical School*

David M. Heer, A.B., A.M., PH.D., Associate Professor of Demography

John B. Wyon, B.A., M.B., B.CH., M.P.H., Senior Research Associate and Lecturer on Population Studies

Stephen J Plank, PH.B., A.B., M.D., M.P.H., DR.P.H., Lecturer on Population Studies

Henry W. Vaillant, A.B., M.D., S.M. IN HYG., Assistant Professor of Population Studies

Helen Gideon, M.B., B.S., M.P.H., Research Associate in Population Studies

*Rodrigo Guerrero, M.D., S.M. IN HYG., DR.P.H., Instructor in Demography and Human Ecology; *Assistant Director, Fundación H. Carvajal, and Auxiliary Professor, Faculty of Medicine, Department of Preventive Medicine, University of Valle, Colombia*

*Gretchen M. Berggren, A.B., M.D., S.M. IN HYG., Research Associate in Demography and Human Ecology; *Assistant to the Director, Community Health Program, Hôpital Albert Schweitzer, Haiti*

Charles Neave, A.B., M.D., M.P.H., DR.P.H., Research Associate in Population Studies

*Roger P. Bernard, M.D., S.M. IN PREV.MED., Consultant on Family Planning; *Research Director, The Pathfinder Fund, Boston*

*Edmund H. Kellogg, A.B., LL.B., Consultant on Family Planning; *Deputy Executive Director, The Pathfinder Fund, Boston*

*Elton Kessel, A.B., M.D., M.P.H., Consultant on Family Planning; *Executive Director, The Pathfinder Fund, Boston*

Hasi M. Venkatachalam, I.SC., M.B.,B.S., M.P.H., Research Fellow in Demography and Human Ecology

The advances of the past century in science, technology, and economic development have revealed unprecedented opportunities for improving the quality of life for much of mankind. Among these opportunities there are several in the field of public health which have been the basis for large-scale programs aimed at prevention and control of major diseases, such as malaria and smallpox. But the striking successes in reducing morbidity and mortality from epidemic diseases have not been consistently accompanied by improvement in the conditions of life. Moreover, the rapid expansion of population in many parts of the world is thwarting the current efforts to provide better housing, education, nutrition, health services and medical care. The disparity between rates of population increase and rates of development of human and economic resources is a crucial problem confronting society.

Acting under the conviction that the health professions can and should participate in general efforts to improve the quality of human life, the Harvard School of Public Health established the Department of Demography and Human Ecology in 1962. By this undertaking the School accepted the responsibility to include problems of human fertility and population growth among the basic factors affecting the health of people and therefore of major importance to success in providing comprehensive health services and medical care for communities and nations throughout the world.

The Department has developed courses of instruction in the biological and social processes which influence population change, in the current means available to control human fertility, and in the physiology of human reproduction. As the Department increases its resources these courses of instruction will be broadened considerably. The formal courses and the tutorial instruction of the Department are planned to prepare students for effective participation in population programs as administrators, research workers, or educators.

The courses of instruction listed below are those intended primarily for students enrolled in the Harvard School of Public Health, but may be elected by students in other parts of Harvard or by other qualified persons who fulfil the criteria for admission as special students.

Candidates for the Master of Public Health degree who elect to concentrate in Demography and Human Ecology are normally expected to take the following courses in addition to the general course requirements:

Demography 2b,c,d
Demography 3c
Demography 4c,d
Demography 5c,d
Demography 30e

Demography and Human Ecology 1a. Population Growth and Fertility Control

Lectures and seminars. *Two one-hour sessions each week, first period.* Dr. Beasley and Staff of the Department.

Credit 1 unit.

Recommended as part of basic core curriculum for Master of Public Health candidates.

Major consideration is given to population growth and to the means of controlling fertility in the context of public health programs. Concepts of ecology are developed to provide an understanding of the relationships between human populations and their environments. The physical, biological, and social forces which influence the demographic characteristics of a population are considered. Techniques for measuring these forces are presented, and their historical trends and future prospects are assessed.

Demography and Human Ecology 2b,c,d. Departmental Seminar

Seminars. *One two-hour session each week, second, third and fourth periods.* Staff of the Department.

Credit 3 units.

This course is oriented toward the research interests of those concentrating in the department. Each student selects a topic for special study on which he presents a critical survey of the relevant literature and later the design of a project which would provide new information. During the initial sessions, and on occasion thereafter, staff members and guests report on their own investigations.

With the permission of the Instructor, students may elect Demography and Human Ecology 2c,d without having taken 2b.

Demography and Human Ecology 3c. Demographic Methods

Lectures. *One two-hour session and one one-hour session each week, third period.*

Laboratory. *One two-hour session each week, third period.* Dr. Heer.

Credit 2 units.

A course on demographic methods with emphasis on the correction of vital statistics and census data, measurement of nuptiality, fertility, contra-

ceptive effectiveness and population growth, and on the preparation of population projections.

Prerequisite: Biostatistics 1a,b.

Demography and Human Ecology 4c,d. Biological Basis for Contraception

Lectures. *One one-hour session each week, third and fourth periods.* Dr. Salhanick, Staff of the Center for Population Studies, and Guest Lecturers.

Credit 1 unit.

This course presents the fundamental physiology and biochemistry related to known and potential methods of family planning. It will cover: the biosynthesis, secretion, effects and modes of action of the gonadal and gonadotropic hormones; the relationship of the natural steroid hormones to synthetic analogues; relationships of chemical structure to physiologic activity of the contraceptive steroids; the human menstrual cycle and early pregnancy; biological basis for potentially new methods; and, factors related to the successful practice of contraception.

Enrollment is subject to the approval of the Instructor.

Demography and Human Ecology 5c,d. Readings in Population Studies

Seminars. *One two-hour session each week, third and fourth periods.* Staff of the Department.

Credit 2 units.

This course is an introduction to the literature pertaining to population theory, research, and fertility control programs. It is offered for students concentrating in the Department. Seminar discussions are directed toward the analysis and evaluation of the assigned selections.

Demography and Human Ecology 6a,b. Problems of Population (Social Relations 192)

Lectures. *Three one-hour sessions each week, first and second periods.* Dr. Heer.

Credit 4 units.

This course reviews the history of the world's population and the social consequences of different population sizes and growth rates. Special attention is paid to a cross-cultural analysis of the social determinants of fertility, mortality and migration.

A term paper (20–25 pages) is a requirement for this course.

Demography and Human Ecology 17a,b,c,d. Tutorial Program

Time and credit to be arranged.

Students at the master's level may make arrangements for tutorial work

and special reading on topics related to population problems. There may be an opportunity to consider the design of studies, programs or analysis of data.

Demography and Human Ecology 20. Research

Doctoral candidates may undertake research in the Department or may integrate research in this field with a doctoral program in another department.

Demography and Human Ecology 30e. Field Visits

January 26 to 31, 1970 or March 29 to April 5, 1970.

Credit 1 unit.

Students majoring in the Department of Demography and Human Ecology participate in visits to organizations currently active in demographic studies, community education, and programs of research and service in fertility control.

Additional Field Study

At the end of the academic year, a field visit may be arranged for students majoring in the Department of Demography and Human Ecology.

Limited to ten students.

Natural Sciences 118. Human Populations and Natural Resources.

This course, which is presented in Harvard College, is open to properly qualified students in the School of Public Health.

Half course (*fall term*). *M. and W. at 10., and one discussion hour to be arranged.* Professor Revelle.

Lectures, discussion, and readings on "The Population Problem," viewed in the context of balancing human populations and their resources; the primary natural resources — earth, air, fire, and water; the total environment as a resource and the ecology of cities. Malthusian and other theories of population equilibrium will be examined and also the determinants and consequences of rapid population change. Special emphasis will be laid on such questions as how the poor countries (two-thirds of mankind) can obtain enough food to feed their peoples, whether and how these countries will be able to limit the increases of their populations; and the effects on the quality of life of population and economic change in the United States and other rich countries.

Enrollment is limited and subject to the approval of the Instructor.

Environmental Health Interdepartmental Courses

The following courses are conducted by the Faculty and Staff of The Kresge Center for Environmental Health which includes the Departments of Environmental Health Sciences, Physiology, and Sanitary Engineering.

Environmental Health Interdepartmental 1a,1b. Principles of Environmental Health

Lectures and demonstrations. *Two one-hour sessions and one two-hour session each week, first and second periods.* Dr. MOELLER and Staff of the Center.

Credit 2 units in each period.

Both periods of this course are recommended for Master of Public Health candidates as part of the basic core curriculum. Required of Master of Industrial Health candidates.

The purpose of the course is to review some of the more important problems associated with man and his environment. Such problems are considered primarily from two points of view:

1. The state of knowledge concerning the effects on man of physical, chemical, radiological, and other changes within the environment. Such effects are weighed in terms of their impact on man's health as well as on other aspects of his life.

2. The measurement of environmental quality and the selection of methods for controlling undesirable or potentially harmful attributes of the environment. Included is an exploratory review of the applications of economic analysis and decision theory to environmental systems.

The schedule has been arranged so that Master of Science in Hygiene candidates may elect either the first or second period to obtain coverage of specific topics. Subjects presented during the "a" period include water purification and waste water treatment, management of solid wastes, accident prevention, and noise measurement and control. Subjects presented during the "b" term include air pollution, ionizing, and non-ionizing radiation, occupational health, and environmental and respiratory physiology.

Environmental Health Interdepartmental 2b,c,d. Aerospace Health and Safety

Seminars. *One two-hour session each week, second, third and fourth periods.* Dr. MCFARLAND and Dr. DOUGHERTY.

Credit 3 units.

The purpose of these seminars is to integrate the work in the basic courses

of public health and preventive medicine with the specialized problems of aerospace health and safety. Lectures and discussions are arranged throughout the year, led by the students, the Instructor, and various biological and medical specialists in the University. Visiting lecturers from other universities and research centers also participate in the seminar.

Enrollment is subject to the approval of the Instructor.

Environmental Health Interdepartmental 5c,d. Occupational Medical Seminars

Seminars, Lemuel Shattuck Hospital. *One two-hour session each week, third and fourth periods.* Dr. TYLER.

Credit 2 units.

The seminars emphasize the effect that non-occupational disease may have on the working capacity of the individual, the criteria for returning such an individual to work, and the rehabilitation program involved.

The seminars are limited to physicians and are not offered if less than four enroll.

Environmental Health Interdepartmental 6c,d. Occupational Medical Clinics

Clinics, Massachusetts General Hospital. *One two-hour session each week, third and fourth periods.* Dr. FERRIS and associates.

Credit 2 units.

These clinics are concerned with diseases due to occupation, such as silicosis, beryllium intoxication, coal miner's pneumoconiosis, and lead poisoning. Special clinics are held in ophthalmology and dermatology.

The clinics are limited to physicians and are not offered if less than four students enroll.

Environmental Health Interdepartmental 8c,8d. Human Factors in Occupational Performance and Safety

Lectures and demonstrations. *One two-hour session each week, third and fourth periods.* Dr. MCFARLAND and Dr. STOUDT.

Credit 1 unit in each period.

In the third period, the lectures and discussions emphasize the application of experimental psychology, anthropology, and biotechnology to the problems of occupational performance and adjustment. Consideration is given to the matching of psychological and physical abilities to job requirements. Emphasis is placed on the importance of designing equipment and work practices in terms of human capabilities and limitations, including those related to fatigue, aging, and environmental stress. In the fourth period the lectures and seminars explore interdisciplinary methods in the analysis and prevention of accidents and injuries. While the major emphasis is on occupational safety, the prevention of other types of accidents is also included.

With the approval of the Instructor, either period may be taken separately.

Environmental Health Interdepartmental 9d. Occupational Medicine

Lectures. *Two two-hour sessions each week, fourth period.* Dr. FERRIS and Dr. WILKINS.

Credit 2 units.

The topics in this course include the administration and organization of occupational medical departments, physical examinations, rehabilitation, counselling, and medico-legal problems. Guest lecturers present problems associated with specific industries. The course is not offered if less than four students enroll.

Environmental Health Interdepartmental 10c,d. Community Air Pollution

Lectures, demonstrations, and seminars. *One two-hour session each week, third and fourth periods.* Dr. FIRST and Staff of the Center.

Credit 2 units.

This lecture and seminar course is designed for engineers, chemists, and physicians interested in air pollution control. Topics presented include the measurement and control of community air pollution; air quality standards; health effects of air pollution; damage to animals, plants and property; community and site surveys; the legal and enforcement aspects of air pollution control; and the nature and quantity of atmospheric emissions from transportation vehicles, municipal incinerators and specific industries.

Environmental Health Interdepartmental 11a,b. Operations Research in Environmental Health Engineering

Lectures and computer exercises. *One three-hour session each week, first and second periods.* Dr. HARRINGTON.

Credit 3 units.

This course is an introduction to the concepts and techniques of operations research, applied to problems of environmental health sciences and engineering. Topics include the following: several interrelated mathematical techniques of optimization — Lagrangian methods, steepest descent, linear, nonlinear and dynamic programming, approximation theory; systems analysis of air and water treatment and solid waste disposal practices; applications of queueing theory, Markov processes, and statistical decision theory.

Prerequisite: Mathematics 20b (Differential Equations), or its equivalent is desirable.

Enrollment is subject to the approval of the Instructor.

Environmental Health Interdepartmental 30e. Field Work

Credit 1 unit.

HARVARD UNIVERSITY

A week of supervised field observation is offered from January 26 to 31, 1970. Students may choose appropriate visits to medical or industrial hygiene departments of industries, airports, and other agencies which have operations or research in the field of environmental health.

Department of Environmental Health Sciences

DADE W. MOELLER, S.B., S.M., PH.D., Professor of Engineering in Environmental Health, Head of the Department *and* Associate Director, Kresge Center for Environmental Health

WILLIAM A. BURGESS, S.B. IN MECH.ENG., S.M., Associate Professor of Environmental Health and Safety Engineering; *Consultant on Environmental Health and Safety, University Health Services*

*RICHARD DENNIS, S.B., S.M., Associate Professor of Applied Environmental Health Engineering; *Director, Pollution Control Laboratory, G.C.A. Corporation, Bedford*

*MELVIN W. FIRST, S.B., S.M., S.D., Associate Professor of Environmental Health Engineering

ABRAHAM S. GOLDIN, A.B., A.M., PH.D., Associate Professor of Radiochemistry

PARKER C. REIST, S.B., S.M., S.M. IN HYG., S.D. IN HYG., Associate Professor of Environmental Health Engineering

*GEORGE F. WILKINS, A.B., M.D., Associate Clinical Professor of Occupational Medicine; *Medical Director, New England Telephone Company*

†JACOB SHAPIRO, S.B., S.M., PH.D., Lecturer on Biophysics in Environmental Hygiene; *Radiological Health and Safety Engineer, University Health Services*

JAMES R. MAHONEY, S.B., PH.D., Assistant Professor of Applied Meteorology

DWIGHT W. UNDERHILL, B.E., S.M. IN HYG., S.D. IN HYG., Assistant Professor of Environmental Health Engineering

FREDERICK J. VILES, JR., S.B., S.M., Research Associate *and* Lecturer on Industrial Hygiene

*JAMES M. AUSTIN, B.A., M.A., S.D., Visting Lecturer on Meteorology and Air Pollution; *Associate Professor of Meteorology, Massachusetts Institute of Technology*

*ALLEN D. BRANDT, S.B., S.M., S.D., Visiting Lecturer on Industrial Hygiene Engineering; *Manager, Environmental Quality Control, Bethlehem Steel Corporation*

*ALLEN L. CUDWORTH, B.E.E., M.E.E., S.D. IN HYG., Visiting Lecturer on Environmental Health Engineering; *Assistant Vice President of Liberty Mutual Life Insurance Companies and Director, Research Center.*

* Part-time in the School of Public Health.

† Part-time in the School of Public Health, full-time in Harvard University.

*John K. Dane, A.B., LL.B., LL.M., Visiting Lecturer on Workmen's Compensation; *Counsel, Liberty Mutual Insurance Companies*

*Sidney Edelman, A.B., LL.B., Visiting Lecturer on Environmental Health Law; *Deputy Chief, Division of Public Health Grants and Services, Office of General Counsel, U.S. Department of Health, Education and Welfare.*

*Horace W. Gerarde, S.B., S.M., M.D., PH.D., Visiting Lecturer on Industrial Toxicology; *Medical Director, Becton-Dickinson Division, Becton, Dickinson and Company*

*Nathan Van Hendricks, B.E., CHEM.E., Visiting Lecturer on Industrial Hygiene Engineering; *Assistant Director for Environmental Sciences, Standard Oil Company (New Jersey)*

*John H. Ludwig, S.B., S.M., S.M. IN HYG., S.D. IN HYG., Visiting Lecturer on Community Air Pollution; *Assistant Commissioner for Science and Technology, National Air Pollution Control Administration, U.S. Department of Health, Education and Welfare*

*Kenneth W. Nelson, ED.B., S.M., Visiting Lecturer on Environmental Health; *Director, Department of Hygiene and Agricultural Research, American Smelting and Refining Company*

*Harry F. Schulte, B.CHEM.ENG., S.M., Visiting Lecturer on Environmental Health Engineering; *Group Leader, Industrial Hygiene Group, Los Alamos Scientific Laboratory, New Mexico*

*Oliver L. Welsh, S.B., A.M., ED.D., Visiting Lecturer on Audiology; *Chief Audiologist, Veterans Administration Clinic, Boston*

Otto Grubner, PH.D., Research Associate in Environmental Chemistry

*Janet W. Cares, S.B., S.M. IN HYG., Assistant in Industrial Hygiene

Donovan B. Yeates, M.SC., Research Fellow in Radiological Health

Hideo Yusa, B.S., D.ENG., Research Fellow in Radiological Health

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Harriet L. Hardy, A.B., M.D., *Lecturer on Medicine, Harvard Medical School; Assistant Medical Director in charge of Occupational Medical Service, Massachusetts Institute of Technology*

Albert O. Seeler, A.B., M.D., *Lecturer on Medicine, Harvard Medical School; Professor and Medical Director, Massachusetts Institute of Technology*

Stanley J. Adelstein, S.B., S.M., M.D., PH.D., *Associate Professor of Radiology, Harvard Medical School*

Edward W. Webster, B.SC., PH.D., *Associate Clinical Professor of Radiological Physics in the Department of Radiology, Harvard Medical School*

Because of the growing public awareness of the need for environmental pollution control and worker protection, an increasing amount of attention

is being focused on these problems at all levels of our society. At the Harvard School of Public Health, research and training have been conducted on these subjects since 1926. Applicable curricula offered by the Department of Environmental Health Sciences include Air Pollution Control, Radiological Health, and Industrial Hygiene. These programs are open to engineers, physicians, and other professional personnel with undergraduate backgrounds in physics, chemistry, and biology.

Graduate training in each of the fields covered by the Department includes courses on human physiology, epidemiology and biostatistics. Typical courses selected as electives in the several options may be as follows:

Air Pollution Control

Community Air Pollution (Environmental Health Interdepartmental 10c,d)
Meteorological Aspects of Air Pollution (Environmental Health Sciences 7c,d)
Instrumental Methods for Environmental Analysis (Environmental Health Sciences 4a,b)
Identification and Measurement of Air Contaminants (Environmental Health Sciences 8c,d)
Aerosol Technology (Environmental Health Sciences 6a,b)
Principles of Toxicology (Physiology 5c,d)

Industrial Hygiene

Basic Problems in Occupational Health and Industrial Environments (Environmental Health Sciences 3c,d)
Environmental Control (Environmental Health Sciences 5c,d)
Human Factors in Occupational Performance and Safety (Environmental Health Interdepartmental 8c,8d)
Environmental Physiology (Physiology 4c)
Instrumental Methods for Environmental Analysis (Environmental Health Sciences 4a,b)
Principles of Toxicology (Physiology 5c,d)
Aerosol Technology (Environmental Health Sciences 6a,b)

Radiological Health

Introduction to Radiation Protection (Environmental Health Sciences 11 a,b)
Radiation Biology (Physiology 7c,d)
Radiation Protection Engineering (Environmental Health Sciences 12a,b)
X-ray Protection (Environmental Health Sciences 14c)
Aerosol Technology (Environmental Health Sciences 6a,b)
Problems in Radiation Dosimetry (Environmental Health Sciences 13c,d)

Supporting the teaching program are extensive research activities. Current studies include an evaluation of performance factors for respirators and gas masks, the application of computer analysis to automatic particle sampling and respiratory deposition, the development and testing of con-

tainment systems for nuclear power reactors, the design of cleanup systems for radioactive sodium aerosols, the application of gas- and liquid-phase reactions to particulate and gas removal, a numerical study of urban scale atmospheric transport, the monitoring of worker stresses by telemetered physiological measurements, and an investigation of methods for reducing the population dose from radiation sources of natural origin. Supporting these studies are related cooperative research projects conducted by the Departments of Physiology and Epidemiology. As a result, students have many excellent opportunities for research, either on an independent basis or as a participant in an ongoing project.

As may be noted, some of the courses in this Department carry "Engineering" numbers. These are cross listed in the catalog of the Division of Engineering and Applied Physics in Cambridge and provide course credit through that Division as well as the School of Public Health.

Environmental Health Sciences 2a,b,c,d. Departmental Seminar

Seminars. *One one-hour session each week, first, second, third and fourth periods.* Staff of the Department.

Credit 2 units.

The purpose of these seminars is to supplement the formal course work of the Department of Environmental Health Sciences by bringing to the attention of the students a wide range of topics of contemporary interest in air pollution control, industrial hygiene, and radiological health. Initial sessions are led by faculty members of the Kresge Center for Environmental Health and cover current research activities within the Center. Subsequent sessions include critical reviews of assigned subjects by students within the Department. Such reviews will be evaluated on the basis of the student's ability to digest and present information on a given topic in an orderly fashion, as well as his ability to evaluate published research papers from the standpoint of the significance of the study, the experimental method, evaluation of the results, and organization of the manuscripts. During other portions, the seminars will be led by specialists from other parts of the University and from industrial, governmental, and university research centers.

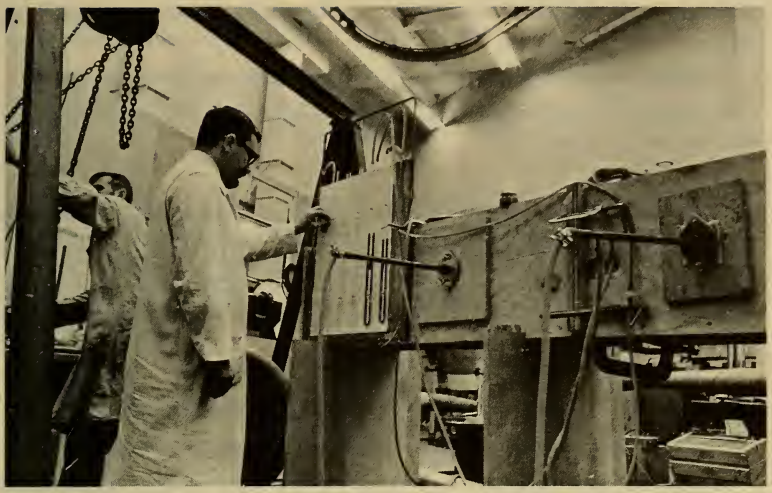
Environmental Health Sciences 3c,d. Basic Problems in Occupational Health and Industrial Environments (Engineering 282)

Lectures. *Two two-hour sessions each week, third and fourth periods.*

Laboratory demonstrations and field trips. *One three-hour session each week, third and fourth periods.* Dr. Ferris, Dr. First, and Staff of the Kresge Center.

Credit 6 units.

A course of lectures, laboratory demonstrations and inspections of work



Research on large air and gas cleaning devices in the pilot plant of the Department of Environmental Health Sciences.

places showing the relation of working conditions to health with special reference to control of industrial hazards. Examples include adverse conditions of temperature, humidity, radiation, and chemical and physical irritants. Particular emphasis is given to the prevention, diagnosis, and treatment of industrial disability and disease, and to workmen's compensation.

Environmental Health Sciences 4a,b. Instrumental Methods for Environmental Analysis

Lectures. *One two-hour session each week, first and second periods.*

Laboratory. *One three-hour session each week, first and second periods.*

Dr. Morris, Mr. Viles and Staff of the Department.

Credit 4 units.

This course offers methods for identifying and quantifying environmental contaminants. Specific sessions are devoted to theoretical and experimental consideration of electrometric, photometric (emission and absorption), and chromatographic techniques. Sampling methods are also discussed and some coverage is provided on methods for chemical separation and concentration.

The course is recommended for all students pursuing programs in Industrial Hygiene and Air Pollution Control. It is also suggested for students in the Radiological Health and the Master of Industrial Health Programs.

Environmental Health Sciences 5c,d. Environmental Control (Engineering 280)

Lectures. *Two one-hour sessions each week, third and fourth periods.*

Laboratory. *One three-hour session each week, third and fourth periods.* Mr. Burgess and Dr. First.

Credit 4 units.

This course deals with selected topics in environmental control for engineers and physical science majors, including thermal environmental engineering, indices of heat stress, industrial ventilation, hood and duct design, performance of air movers and air cleaning devices, air conditioning, and specially controlled environments such as clean rooms, hospital operating rooms, and experimental animal quarters.

Environmental Health Sciences 6a,b. Aerosol Technology (Engineering 286)

Lectures. *Two one-hour sessions each week, first and second periods.*

Laboratory. *One two-hour session each week, first period; one four-hour session each week, second period.* Dr. Reist.

Credit 4 units.

This course deals with the properties of particulate clouds and the physical principles underlying their behavior, including aerosol measurement. Topics include individual particle trajectories, diffusion, condensation and evaporation, electrical and optical properties, and coagulation, as well as the behavior of the cloud *in toto.*

Environmental Health Sciences 7c,d. Meteorological Aspects of Air Pollution

Lectures and demonstrations. *One two-hour session each week, third and fourth periods.* Dr. Mahoney.

Credit 2 units.

This course presents an evaluation of the meteorological factors associated with the transport of air pollutants. Topics include the properties of the atmosphere near the ground, turbulent dispersion of pollutants, instrumentation for evaluating the movement and behavior of air pollutants, atmospheric diffusion equations, diffusion from single and area sources, and mathematical models for evaluating urban air pollution. Applications of meteorological theory to air pollution phenomena are emphasized through demonstrations and the assignment of specific problems.

Admission is subject to the approval of the Instructor.

Environmental Health Sciences 8c,d. Identification and Measurement of Air Contaminants (Engineering 283)

Lectures. *Two one-hour sessions each week, third and fourth periods.*

Laboratory. *One three-hour session each week, third and fourth periods.* Mr. Viles and Staff of the Department.

Credit 4 units.

This course emphasizes sampling and analytical methods for air contaminants plus related subjects not covered in Environmental Health Sciences 4a,b. Included are chemical methods of air analysis, dust identification, isokinetic sampling, duct and stack sampling, biological and solvent analysis, radioactive aerosol determinations, air pollution surveys and fire and explosion evaluations.

This course is intended for air analysts, engineers and physicians.

Prerequisite: Environmental Health Sciences 4a,b.

Environmental Health Sciences 11a,b. Introduction to Radiation Protection

Lectures. *Two one-hour sessions each week, first and second periods.*

Laboratory and field trips. *One three-hour session each week, first and second periods.* Dr. Goldin and Dr. Reist.

Credit 4 units.

This course is an introduction to the health and safety problems accompanying the use of ionizing radiations. Laboratory exercises provide an introduction to radiation sources, techniques for their measurement, and the safe use of radionuclides. Lecture topics include the elements of radioactivity; interaction of radiations with matter; calculation of radiation dose rates and shielding; neutron activation; radiation protection standards; major sources of population exposure including background radiation, medical X-rays, and fallout from nuclear detonations; radiation protection procedures.

Environmental Health Sciences 12a,b. Radiation Protection Engineering (Engineering 287)

Lectures. *Two two-hour sessions each week, first and second periods.* Dr. Shapiro.

Credit 4 units.

This course deals with the basic theory and calculations utilized in radiation control and nuclear safety. Specific topics include introduction to reactor physics, safeguards for preventing criticality and reactor accidents, radiation shielding, radiation damage, and analysis of environmental reactor hazards.

Prerequisites: Physics 112b or Environmetal Health Sciences 11a,b.

Environmental Health Sciences 13c,d. Problems in Radiation Dosimetry

Lectures. *Two one-hour sessions each week, third and fourth periods;* laboratory, *one three-hour session each week, third period.* Dr. Shapiro.

Credit 3 units.

This course deals with the experimental and theoretical methods of evaluating radiation fields and determining radiation dose rates. Special dosimetry problems for study in the laboratory are selected from the fields of health physics, nuclear engineering, and nuclear medicine.

Prerequisite: Environmental Health Sciences 11a,b.

Environmental Health Sciences 14c. X-ray Protection

Lectures. *One two-hour session each week, third period.*

Laboratory. *One three-hour session each week, third period. Time to be arranged.*
Dr. Webster.

Credit 2.5 units.

This course covers the fundamentals of X-ray equipment (both industrial and medical), the design of X-ray installations, and procedures for radiation protection surveys and inspections. Considerations include both equipment and room design with emphasis on such items as leakage, collimation, filtration, primary and secondary barriers, workload, and protection of patients. X-ray measuring instruments are evaluated with respect to their use and calibration as well as to performance characteristics such as time response, energy dependence and directional dependence. Included in the course are several problem assignments ranging from the design of individual protective components up to, and including, the design of a complete protective installation.

Environmental Health Sciences 15c,d. Measurement and Applications of Radionuclides

Lectures. *One one-hour session each week, third and fourth periods.*

Laboratory. *One three-hour session each week, third and fourth periods.* Dr. Goldin and Dr. Adelstein.

Credit 3 units.

This course presents the fundamentals of radionuclide techniques for application to research problems in medicine, biology, and environmental control. Topics covered include the theory and practice of radionuclide identification and measurement, sampling and sample preparation, and radiochemical separations. Auxiliary techniques considered include activation analysis, production of short-lived nuclides, and isotope "milking." Laboratory sessions are arranged to permit an option so that students can perform

experiments on either biochemical tracer applications or environmental radioactivity.

This course is intended for students and research workers in the medical and biological sciences or environmental health. Previous training or experience with radioactive materials is not required.

Environmental Health Sciences 17a,b,c,d,e.

Tutorial Program (Reading or Research). *Time and credit to be arranged.*

Reading or research assignments for individual tutorial work at a Master's degree level are provided for qualified students in the fields of industrial hygiene, industrial ventilation, aerosol technology, radiological hygiene, solid waste management and air pollution control.

Enrollment is subject to the approval of the Head of the Department.

Environmental Health Sciences 20. Research

Properly qualified students at the post-master's level or those who have been accepted as doctoral candidates are given an opportunity to pursue independent research work on problems of industrial hygiene, industrial ventilation, aerosol technology, solid waste management, air pollution control and radiological health.

Enrollment is subject to the approval of the Head of the Department.

Department of Epidemiology

BRIAN MACMAHON, M.B., CH.B., D.P.H., PH.D., S.M. IN HYG., M.D., Professor of Epidemiology *and* Head of the Department

JANE WORCESTER, A.B., DR.P.H., S.D. (hon.), Professor of Biostatistics and Epidemiology

*THOMAS F. PUGH, M.D., M.P.H., Associate Professor of Applied Epidemiology; *Director, Division of Medical Statistics and Research, Massachusetts Department of Mental Health*

ASCHER J. SEGALL, M.D., M.P.H., DR.P.H., Associate Professor of Epidemiology

OLLI S. MIETTINEN, M.D., M.P.H., M.SC., PH.D., Associate Professor of Epidemiology and Biostatistics.

THEODOR ABELIN, M.D., M.P.H., Assistant Professor of Epidemiology

PHILIP T. COLE, A.B., M.D., M.P.H., Assistant Professor of Epidemiology

RICHARD R. MONSON, S.B., M.D., S.M. IN HYG., S.D. IN HYG., Assistant Professor of Epidemiology

SIDNEY COBB, S.B., M.D., M.P.H., Lecturer on Epidemiology; *Program Director, Survey Research Center, University of Michigan* (to February 28, 1970)

*GEORGE B. HUTCHISON, A.B., M.D., M.P.H., Visiting Lecturer on Epidemiology; *Staff Member, Michael Reese Hospital and Research Institute, Chicago*

*ROBERT W. MILLER, A.B., M.D., M.P.H., DR.P.H., Visiting Lecturer on Epidemiology; *Chief, Epidemiology Branch, National Cancer Institute*

*EMILIO C. VENEZIAN, B.ENG., S.M., PH.D., Lecturer on Epidemiology; *Member, Operations Research Section, Arthur D. Little, Inc., Cambridge*

STELLA B. YEN, M.D., M.P.H., Research Associate in Epidemiology

DOUGLAS I. HAMMER, S.B., M.D., M.P.H., Teaching Fellow in Epidemiology

ALEXANDER J. MCLEAN, B.E., M.E., S.M., IN HYG., Teaching Fellow in Epidemiology

JOHN W. POUNDSTONE, A.B., M.D., M.P.H., Teaching Fellow in Epidemiology

MILDRED R. RENSI, S.B., Assistant in Epidemiology

HERMANN LISCO, M.D., *Lecturer on Pathology and Assistant Dean for Student Affairs, Harvard Medical School*

ROBERT L. GLASS, S.B., D.M.D., M.P.H., DR.P.H., *Associate Clinical Professor of Ecological Dentistry, Harvard Dental School*

* Part-time in the School of Public Health.

The major objective of the Department of Epidemiology is to provide opportunities for training and experience in the application of epidemiologic research methods to the investigation of diseases of unknown etiology. Emphasis is on the cardiovascular and mental disorders, the malignant neoplasms, abnormalities of reproduction and development, and other major diseases for which preventive measures are still unknown or inadequate.

A one-year research-training program leads to the degree of Master of Science in Hygiene in the field of Epidemiology. This program usually includes the following courses: Epidemiology 1a,b, 3c,d, and 8b; Biostatistics 1a,b, 3c,d, and 13e; and Biostatistics and Epidemiology 2b,c,d, and 6c,d — a total of 19.5 credit units. The remainder of the credits required for the degree may be taken as additional formal courses in areas of special interest, or as supervised research (Epidemiology 17a,b,c,d).

For qualified students the period of research training may be extended by admission to either of the doctoral programs offered by the School, by admission to special student status, or through other individual arrangements. During the second and subsequent years of training, students whose first year was in the Master of Public Health program are expected to enroll in any of the above courses which were not taken in their first year. Other courses in this or other schools of the University may also be elected. However, most of the training period beyond the master's degree is occupied by the completion of a research project and, in the case of doctoral candidates, preparation of a thesis. Doctoral candidates must plan at least two years in residence beyond completion of the master's degree.

A three-year residency in the Department of Epidemiology has been approved as satisfying residency requirements of the American Board of Preventive Medicine for certification in General Preventive Medicine. Requirements of the approved residency and of the School's degree programs may be satisfied simultaneously.

Fellowships for research training programs are provided in U.S. Public Health Service training grants to the Department. The Public Health Service also has a program of traineeship grants for support of residents in approved preventive medicine residencies. Traineeships from these sources are restricted to U.S. citizens or physicians who have been admitted to the United States for permanent residence. Applications should be submitted through the Department of Epidemiology.

Epidemiology 1a,b. Principles of Epidemiology

Lectures, laboratories, and seminars. *One one-hour and one two-hour session each week, first and second periods.* Dr. MacMahon.

Credit 2.5 units.

Recommended as part of basic core curriculum for Master of Public Health candidates. Required of Master of Science in Hygiene candidates.

Lectures, laboratory work and seminars on the principles, purposes and methods of epidemiology. Principles are illustrated by reference to classic epidemiologic investigations of infectious and non-infectious diseases.

Biostatistics and Epidemiology 2b,c,d. Design of Investigations

Seminars. *One two-hour session each week, second, third, and fourth periods.* Dr. MacMahon.

Credit 3 units.

This course is for students with a major interest in epidemiology or biostatistics. Participants select a problem in apparent need of investigation, and prepare and present for group discussion a summary of the present status of knowledge of the problem and the design of a study directed towards advancement of present knowledge.

Enrollment is subject to the approval of the Instructor.

Epidemiology 3c,d. Epidemiology of Non-Infectious Diseases

Lectures. *Two one-hour sessions each week, third period; one two-hour session each week, and one one-hour session each week, fourth period.* Dr. Cole and Staff of the Department.

Credit 2.5 units.

A review of existing knowledge of the epidemiology of diseases of unknown etiology or associated with etiologic factors which are not at present known to be of infectious nature. Emphasis is on the more common conditions, including the degenerative and malignant diseases. Attention is given to the methodologic difficulties associated with the epidemiologic investigation of chronic diseases.

Biostatistics and Epidemiology 6c,d. Research Methods in Epidemiology

Lectures. *One two-hour session each week, third and fourth periods.* Dr. Worcester and Staffs of the Departments of Biostatistics and Epidemiology.

Credit 2 units.

Primarily for Master of Science in Hygiene and doctoral candidates in Epidemiology or Biostatistics.

This course is concerned with statistical and other problems commonly encountered in epidemiologic research. Examples include assessment of data quality, misclassification, nonresponse, population sampling, matching, and analytic techniques for birth order effects, time-space clusters, cyclical variations, and measurement of survival.

Prerequisite: Enrollment in Biostatistics 3c,d.

Enrollment is subject to the approval of the Instructor.

Epidemiology 8b. Human Genetics

Lectures. *Two one-hour sessions each week, second period.* Dr. MIETTINEN.

Credit 1 unit.

The objective of this course is to give an introduction to the principles of genetic explanation of the occurrence of human illness. The topics covered include: chromosome aberrations as causes of disease; causes of chromosome aberrations; genes and the biochemical basis of inherited traits; inborn errors of metabolism; ascertainment and other problems in exploring mode of inheritance by means of family data; consanguinity; evaluation of the relative roles of genetic and environmental components in disease etiology (with special emphasis on twin studies); blood group incompatibility; and some aspects of population genetics.

Epidemiology 9d. Epidemiology of Oral Diseases

Lectures and seminars. *One two-hour session each week, fourth period.* Dr. GLASS.

Credit 1 unit.

This course is primarily for dentists in the dental epidemiology and dental public health training programs. It includes review of current knowledge of the epidemiology of oral diseases and of methodologic problems in surveys and clinical trials in dental epidemiology.

The topics to be covered are dental caries, fluoridation, oral cancer, periodontal diseases, oral congenital malformations, indices of oral health, survey methodology, and design of clinical trials in oral diseases.

Epidemiology 17. Introduction to Research

Participation in departmental research in close association with a staff member. Time and credit are to be arranged with the Head of the Department.

Epidemiology 20. Research

In selecting topics for research in doctoral programs, students should consider the fields in which members of the Department are currently working. These include:

Neoplastic disease (Dr. MACMAHON, Dr. COLE, Dr. MONSON)
Mental illness (Dr. PUGH, Dr. ABELIN)
Congenital malformation (Dr. MACMAHON, Dr. MIETTINEN, Dr. YEN)
Cardiovascular disease (Dr. SEGALL)
Statistical methods (Dr. MIETTINEN, Dr. VENEZIAN)

Department of Health Services Administration

ALONZO S. YERBY, S.B., M.D., M.P.H., Professor of Health Services Administration, Head of the Department, *and* Director of the Interfaculty Program on Health and Medical Care

WILLIAM J. CURRAN, S.B., LL.B., LL.M., S.M. IN HYG., Frances Glessner Lee Professor of Legal Medicine in the Faculty of Medicine and the Faculty of Public Health

PAUL M. DENSEN, A.B., S.D., Professor of Community Health; *Director of The Center for Community Health and Medical Care, Harvard Medical School and Harvard School of Public Health.*

*ALFRED L. FRECHETTE, M.D., M.P.H., Clinical Professor of Public Health Practice; *Commissioner of Public Health, Commonwealth of Massachusetts*

†SIDNEY S. LEE, S.B., M.D., M.P.H., DR.P.H., Clinical Professor of Hospital and Medical Care Administration; *Associate Dean for Hospital Programs, Harvard Medical School*

RALPH E. BERRY, JR., A.B., A.M., PH.D., Associate Professor of Economics

BASIL J. F. MOTT, A.B., M.P.A., PH.D., Associate Professor of Health Services Administration

MARJORIE A. C. YOUNG, S.B., ED.M., M.P.H., DR.P.H., Associate Professor of Health Education

DONALD A. KENNEDY, A.B., PH.D., Lecturer on Health Services Administration; *Assistant Director of the Center for Community Health and Medical care, Harvard Medical School and Harvard School of Public Health*

JEANNETTE J. SIMMONS, S.B., M.P.H., S.D. IN HYG., Lecturer on Health Education

NAOMI M. WEISS, B.N., S.M., Lecturer on Health Services Administration

*R. FRANCES GROMMERS, S.B., M.D., M.P.H., Assistant Professor of Health Services Administration

*WILLIAM E. HASSAN, JR., S.B., S.M., PH.D., LL.B., Visiting Lecturer on Hospital Administration; *Director, Peter Bent Brigham Hospital*

*JACK KASTEN, S.B., M.P.H., LL.B., Visiting Lecturer on Health Services Administration; *Director, Clinical Services, Beth Israel Hospital*

*EDWARD B. KOVAR, A.B., A.M., Visiting Lecturer on Community Health Planning; *Director, Health, Hospitals and Medical Care Division, United Community Services*

* Part-time in the School of Public Health.
†Part-time in the School of Public Health, full-time in Harvard University.

*Samuel Levey, A.B., A.M., A.M., PH.D., S.M. IN HYG., Visiting Lecturer on Health Services Administration; *Professor of Health Services Administration, Mt. Sinai Medical School, New York*

*Curtis P. McLaughlin., A.B., M.B.A., D.B.A., Visiting Lecturer on Health Systems Analysis; *Associate Professor of Public Administration, University of North Carolina*

*Robert Morris, A.B., S.M., D.S.W., Lecturer on Social Planning; *Professor of Social Planning, The Florence Heller Graduate School for Advanced Studies in Social Welfare, Brandeis University*

*Harry T. Phillips, M.B., CH.B., D.P.H., M.D., Visiting Lecturer on Health Services Administration; *Chief of Bureau of Chronic Disease Control, Massachusetts Department of Public Health, and Superintendent, Lemuel Shattuck Hospital*

*Andrew P. Sackett, M.D., D.P.H., Visiting Lecturer on Health Services Administration; *Commissioner of Health and Hospital, City of Boston*

*Edward L. Walls, Jr., S.B., A.M., Visiting Lecturer on Health Services Administration; *Assistant Professor of Finance, Northeastern University*

*Henry Wechsler, A.B., A.M., PH.D., Lecturer on Social Psychology; *Research Director, The Medical Foundation, Inc.*

*Joseph A. Yacovone, A.B., D.M.D., M.P.H., Lecturer on Dental Public Health; *Executive Director, Office of Comprehensive Health Planning, Rhode Island Department of Health*

*David R. Kinloch, M.D., D.P.H., S.M. IN HYG., Instructor in Health Services Administration; *Director, Division of Medical Care, Massachusetts Department of Public Health*

The following members of other Harvard Faculties participate in teaching in the Department of Health Services Administration:

Leona Baumgartner, A.B., A.M., PH.D., M.D., *Visiting Professor of Social Medicine, Harvard Medical School*

Ray E. Brown, S.B., M.B.A., DR.HUM. (hon.), *Executive Vice President of Affiliated Hospitals Center, and Professor of Administration, Harvard Medical School*

John T. Dunlop, A.B., PH.D., A.M. (hon)., *David A. Wells Professor of Political Economy, Faculty of Arts and Science and Member of the Faculty of the School of Government*

James M. Dunning, A.B., D.D.S. M.P.H., *Professor and Head, Department of Ecological Dentistry, Harvard School of Dental Medicine*

HARVARD UNIVERSITY

Osler L. Peterson, M.B., M.D., M.P.H., *Professor of Preventive Medicine, Harvard Medical School and Member of the Faculty of the School of Government*

Martin S. Feldstein, A.B., A.M., D.PHIL.OXON., *Professor of Economics, Faculty of Arts and Sciences*

Leonard W. Cronkhite, Jr., A.B., M.D., *Lecturer on Preventive Medicine, Harvard Medical School; General Director, Children's Hospital Medical Center*

Robert C. Buxbaum, A.B., M.D., *Instructor in Medicine, Harvard Medical School; Director of the Medical Clinics, Peter Bent Brigham Hospital*

Our contemporary health systems are in a dynamic state of change. Increasingly, health is considered to be a basic human right. Government is more and more being thrust into the health field, for the benefit of both the individual and the community. The increasing complexity of medical technology calls for diverse types of health organizations. This vast growth of organized health services has created an increased need for qualified administrators and researchers.

With the projection of the hospital into community health services and the health department into personal care services, a specialized field of health services administration is emerging. Leadership and research are required to ensure high quality service to both the individual and the community. Health professionals must do more than just provide service, they must be concerned with policy formation, administration, and research. One of the main goals of the Department of Health Services Administration is to provide this education for leadership in health service organizations. Emphasis is placed on planning, organization, delivery, and evaluation of health services. Efforts are made to adapt relevant concepts of administrative and organizational theory to the practical problems of providing health services. The Department is concerned with research designed to improve the methodology of measuring the effectiveness of health services and in the development and testing of models of health systems and sub-systems.

The important roles of government, voluntary agencies, and pre-payment insurance systems are also coming to the fore. In order to allow the potential health leader to meet the challenges of future change, the principles and techniques of administration, particularly planning and evaluation, are emphasized. Traditional administrative techniques such as budget preparation, personnel mannagement, and supervision are treated; as well as more recently developed quantitative analytic methods. Since there are many problems broad in scope which must be studied, the resources of multiple disciplines and several Harvard faculties are carefully integrated into the program.

Since health services administration is fundamentally concerned with the physician and the hospital, the Department maintains close liaison relation-

ships with Harvard Medical School and with several Harvard University affiliated hospitals. Thus, to the Harvard School of Public Health's expertise in community health, preventive medicine, and research are added the resources of medical education, university hospitals, and the discipline of hospital administration. Since the teaching of health services administration also involves training in business administration and economics, liaison relationships have been developed between the School and the Harvard School of Business Administration and the Department of Economics of Harvard University. An important element of community health services training is provided by the mutually beneficial relationships with the Massachusetts Department of Public Health, the Boston City Department of Health and Hospitals, the Cambridge City Department of Health and Hospitals, and the Tri-State Regional Medical Program. Finally, the Department of Health Services Administration works in close cooperation with the Harvard Center for Community Health and Medical Care.

Health Services Administration and Maternal and Child Health, 1a,b. Provision of Health Services and Medical Care

Lectures and discussions. *Two two-hour sessions each week, first and second periods.* Dr. YERBY, Dr. SCHMIDT, and Staffs of the Departments.

Credit 4 units.

Recommended as part of basic core curriculum for Master of Public Health candidates.

This course is offered jointly by the Department of Health Services Administration and the Department of Maternal and Child Health and forms the basis for additional courses in both departments. It emphasizes basic concepts essential in the planning, organization, and administration of government and private health programs for all age groups.

Among the subjects discussed are legal, sociocultural, and economic factors which affect the provision of health and medical care services; internal management of health agencies; characteristics of health agency interrelationships; health manpower requirements; and planning for medical care services.

Health Services Administration 2b,c,d. Departmental Seminar

Seminars. *One two-hour session each week, second, third and fourth periods.*

Credit 3 units.

2b. Dr. MOTT

This first sequence is concerned with political factors affecting the formulation and implementation of public health policies with particular emphasis on the politics of health planning.

2c. Dr. Kennedy and Miss Weiss

The second sequence is a combination of discussion, field work, and the use of case material. It is designed to help the student understand the community through an analysis of its social characteristics and their influence on planning and policy formulation in respect to the organization of health agencies and health services.

2d. Dr. Yerby

The third seminar sequence is a comparative analysis of the organization and financing of personal health service systems in selected developed nations.

Health Services Administration 3c,d. Administration and Organization of Health Services

Seminars. *Two two-hour sessions each week, third and fourth periods.* Dr. Mott.

Credit 4 units.

Analysis of the character and functions of the administrative process in health agencies and facilities. The course will focus upon: organizational factors that shape and constrain the administrative process; decision-making and planning; techniques of administrative control (program planning, budgeting, personnel management, systems analysis, cost benefit and cost effectiveness analysis, etc.); problems of administrative control (conflicts between staff and line, organizational design, reorganization, centralization versus decentralization, etc.); and differences in administration among health organizations. Students will participate in a group field exercise in which they will prepare for an agency a program plan that takes account of actual community and organizational realities.

Health Services Administration 4c,d. Issues in Medical Care (Economics 285b)

Seminars. *Two two-hour sessions each week, third and fourth periods.* Dr. Lee, Dr. Peterson, Dr. Berry and Dr. Kinloch.

Credit 4 units.

This interdisciplinary course deals in detail with major issues in the economics and administration of medical care programs. It is designed for graduate students from the Schools of Public Health, Medicine, Business Administration, and Government, and the Department of Economics. Seminars are conducted by the Interfaculty Committee on Health and Medical Care composed of representatives from the participating Faculties. The course, Health Services Administration 1a,b, Provision of Health Services and Medical Care, provides an appropriate introduction for School of Public Health students.

During the first section of the course, major issues concerning resources, organizational structure, methods of payment, and the need and demand for medical care are examined. Among the considerations explored are the organization of medical practice and health services, changing requirements for health manpower and the role of medical education, quantitative and qualitative standards for medical care, and factors influencing the utilization, efficiency, and cost of medical care in the United States and other countries. Special reading materials selected and prepared by the seminar staff serve as the basis for seminar discussions.

In the second section of the course, emphasis is on analysis, planning, and decision making through the use of case studies on specific programs and problems in medical care. The subjects covered include government health plans; cost, utilization, structure, and quality of personal health services; and organizational and manpower problems in medical care programs.

Health Services Administration 5c,d. Health Education

Seminars. *One two-hour session each week, third and fourth periods.* Dr. YOUNG and Dr. SIMMONS.

Credit 2 units.

This course emphasizes major aspects of learning theory, communication theory, educational methods, and health behavior; health education in the process of social change; psychosocial and cultural factors relevant to the planning of health education programs; and research and evaluation in health education. The major focus of the course is on health education aspects of community health programs, including school health services.

Health Services Administration 6c. Legal Problems of Organized Health Programs

Seminars. *One two-hour session each week, third period.* Professor CURRAN.

Credit 1 unit.

This course is designed for students who are particularly interested in the legal aspects of health programs.

Seminars include discussions of constitutional problems in public health programs, the legislative process, professional and legal standards for quality of medical care, legal considerations in medical care organization, general considerations of administrative law, regulation making by health organizations, legal reforms in personal injury litigation, and the presentation of expert medical testimony.

Health Services Administration 7c,d. Dental Public Health Practice

Seminars and field visits. *One two-hour session each week, third and fourth periods.* Dr. DUNNING and Dr. YACOVONE.

Credit 2 units.

This seminar course is designed for dentists and for those of other disciplines who desire training in depth in the administration and planning of dental health programs. All phases of dental public health are covered including dental needs, resources, surveying, dental health education, fluoridation, prepayment, and evaluation of programs. Reading assignments are used to stimulate class discussion. Participants make field trips to several dental facilities. Students may elect to do advanced work in any phase of dental public health.

Health Services Administration 8c,d. Health Planning, Economic Growth and Development

Lectures and discussion. *One two-hour session each week, third and fourth periods.* Dr. BERRY.

Credit 2 units.

This interdisciplinary course focuses on the relationship between health and economic growth. It is designed for students who have a particular interest in the role of health planning in both developed and less developed nations.

The course provides the student with an introduction to economic analysis, the processes of economic development and economic growth, and the interrelationship of health and economic growth. Topics considered include essentials of the market economy, the determination of national income, economic development, economic growth, the role of government, cost-benefit analysis, and economic planning. Problems of health planning and approaches to the integration of health planning and economic planning are discussed.

Health Services Administration 9a,b. Economics of Health Care Policy

Seminars. *One two-hour session each week, first and second periods.* Dr. BERRY and Dr. FELDSTEIN.

Credit 2 units.

This is an advanced interdisciplinary course for doctoral candidates at the schools and departments associated in the Interfaculty Program — the Schools of Public Health, Medicine, Government, Business Administration, and the Department of Economics — and for students with advanced standing at the School of Public Health.

The course is concerned with the application of the analytic framework and methodology of economics to a number of specific problems in the broad area of medical care. The emphasis is on the techniques of analysis and statistical measurement, and no attempt is made to treat the entire field of medical care comprehensively. Seminar faculty and faculty members of other institu-

tions are invited to present their research findings on specific problems for critical examination by the group. Advanced students who are conducting research in medical care are also expected to report on their studies for discussion by the group.

The course provides a survey of the basic economic issues of American health care policy. Topics will include: the role of the market and government planning; health manpower; government insurance and finance programs; rising costs; the provision of urban medical services.

Health Services Administration 10c,d. Modern Planning and Management Techniques

Seminars. *One two-hour session each week, third and fourth periods.* Dr. GROMMERS.

Credit 2 units.

This is an informal interdisciplinary seminar for students at the Schools and Departments associated in the Interfaculty Program, which include the Schools of Public Health, Medicine, Government, Business Administration, and the Department of Economics.

The course is concerned with the problems involved in innovations in health service systems of modern planning and management techniques, such as system analysis," decision theory, information systems, and automation. Examples will be presented with emphasis on *applicability* in the health field rather than mathematical techniques: interdependency of parts and their relation to the whole complex system and its objectives will be clarified.

Current uses of computers in health care systems will be discussed by active members of the field. There will be opportunity for guided practical experience with these techniques.

The objective of the course is to improve the basis for communication between technically and non-technically oriented professional members of the health care field. The course is designed to provide a basis for understanding the terminology and an appreciation of these techniques for administration and planning of health services. Mathematics background is not required.

Health Services Administration 11c,d. Administration of Personal Health Service Programs

Seminars and community laboratory exercises. *One two-hour session each week, third and fourth periods.* Staff of the Department.

Credit 2 units.

The course is designed for students who will be administrators of personal health service programs. Inpatient (general hospital, specialty hospital, and long-term care facility), ambulatory (private physician, group, hospital out-

patient and emergency), home, multiple screening and rehabilitation programs are treated from an operational and preventive perspective. Special emphasis is placed on services for the chronically ill and/or aged and administrative problem solving. Students analyze administrative problems in operating personal care service programs.

Biostatistics and Health Services Administration 16d. Health Program Evaluation

Seminars. *One two-hour session each week, fourth period.* Dr. DENSEN, Dr. FELDMAN, Mr. FRAZIER and Dr. REED.

Credit 1 unit.

This seminar is designed for students interested in the evaluation of ongoing health programs. Groups of students present for discussion their review of program evaluation methods used to assess the effectiveness of operating health programs.

Health Services Administration 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Master's degree candidates may make arrangements to do individual and group work under the guidance of a staff member of the Department.

This work can include readings and special projects in such areas as dental health, medical care, and health education. In addition, field assignments to federal, state, and local government and private health organizations can be arranged.

Health Services Administration 20. Research

Doctoral candidates are offered the opportunity of undertaking individual study and research as the basis for a doctoral thesis.

Health Services Administration 30e. Assignments to Field Agencies

January 26–31, 1970.

Credit 1 unit.

Students are assigned to work in the field on special projects, on group surveys or other types of field projects, or for observation of, and limited participation in, the work of health agencies.

Field assignments are made on an individual basis to meet the special needs of each student insofar as possible. Work in the field is coordinated with courses in the Department.

Department of Maternal and Child Health

William M. Schmidt, s.b., m.d., a.m. (hon.), Professor of Maternal and Child Health *and* Head of the Department

*Leon Sternfeld, s.b., m.d., ph.d., m.p.h., Associate Professor of Applied Maternal and Child Health; *Deputy Commissioner and Director of Local Health Services, Massachusetts Department of Public Health*

Isabelle Valadian, m.d., m.p.h., Associate Professor of Maternal and Child Health

James E. Teele, a.b., a.m., ph.d., Associate Professor of Sociology in the Faculty of the Graduate School of Education and the Faculty of Public Health

Alfred Yankauer, a.b., m.d., m.p.h., Senior Research Associate and Lecturer on Maternal and Child Health

*Arthur J. Lesser, a.b., m.d., m.p.h., Visiting Lecturer on Maternal and Child Health; *Deputy Chief, Children's Bureau, United States Department of Health, Education and Welfare*

*Robert Morris, a.b., s.m., d.s.w., Lecturer on Social Planning; *Professor of Social Planning, The Florence Heller Graduate School for Advanced Studies in Social Welfare, Brandeis University*

*Helen D. Cohn, m.p.h., Instructor in Applied Public Health Nursing; *Associate Professor of Public Health Nursing, Boston University School of Nursing*

*Ruth A. Cowin, s.b. s.m., Instructor in Applied Public Health Social Work

Ruth M. Butler, a.b., s.m., Research Associate in Social Work

Miriam C. Ekdahl, s.b., s.m. in s.s., Assistant in Social Work

The following individuals who hold appointments in Harvard Medical and Dental Schools participate in teaching in the Department of Maternal and Child Health

Charles A. Janeway, a.b., m.d., a.m. (hon.), *Thomas Morgan Rotch Professor of Pediatrics*

Duncan E. Reid, s.b., m.d., a.m. (hon.), *William Lambert Richardson Professor of Obstetrics*

William Berenberg, a.b., m.d., *Clinical Professor of Pediatrics*

Coenraad F. A. Moorrees, d.d.s., a.m. (hon.), *Professor of Orthodontics at the Forsyth Dental Infirmary for Children, Research Associate in Odontology*

* Part-time in the School of Public Health.

Robert B. Berg, a.b., m.d., *Assistant Professor of Pediatrics at Beth Israel Hospital*

Thomas E. Cone, Jr., m.d., *Clinical Professor of Pediatrics*

Joel J. Alpert, a.b., m.d., *Associate in Pediatrics*

Robert G. Rosenberg, m.d., *Instructor in Pediatrics*

The Department of Maternal and Child Health is concerned with education and research in health services for mothers and children a.) as a part of general health services and b.) as they relate to other service systems (especially social services and education). The planning for the delivery of personal health, social, and family planning services to mothers and children depends upon knowledge of:

1. the aspirational values which society places upon them, their special vulnerability to biological and environmental hazards, and the successive phases of biological change (growth and development);
2. the social situation and the way in which social services function as they affect the health of children and influence the child-care capability of families;
3. the health aspects of centers of early childhood education, and traditional and innovative practices in elementary and high schools.

The courses and tutorial work offered by the Department are focused on actions which these characteristics demand for planning, administration, and evaluation of health care services. Maternal and Child Health services, including services for handicapped children, at international, national, and local levels, are discussed in terms of integration with related health services in the community. In connection with this Departmental focus, the important roles of national governments, local health agencies, voluntary organizations, and community consumer groups are considered in seminars, observations of service programs in operation, or study of reports of such programs, foreign as well as domestic.

Fellowships are available for students who are concentrating in Maternal and Child Health. Candidates concentrating in Maternal and Child Health are normally expected to take the following courses in addition to satisfying the course requirements for the degree:

Maternal and Child Health 2b

Maternal and Child Health 3c,d

Health Services Administration and Maternal and Child Health 1a,b. Provision of Health Services and Medical Care

Lectures and discussions. *Two two-hour sessions each week, first and second periods.* Dr. Yerby, Dr. Schmidt, and Staffs of the Departments.

Credit 4 units.

Recommended as part of basic core curriculum for Master of Public Health candidates.

This course is offered jointly by the Department of Health Services Administration and the Department of Maternal and Child Health and forms the basis for additional courses in both departments. It emphasizes basic concepts essential in the planning, organization, and administration of government and private health programs for all age groups.

Among the subjects discussed are legal, sociocultural, and economic factors which affect the provision of health and medical care services; internal management of health agencies; characteristics of health agency interrelationships; health manpower requirements; and planning for medical care services.

Maternal and Child Health 2b. Comprehensive Maternal and Child Health Care

Seminars and field visits. *One two-hour session each week, second period.* Dr. VALADIAN and Staff of the Department.

Credit 1 unit.

The course is divided into four field observations and four seminars. The field visits are to centers providing comprehensive care in the Metropolitan Boston area. The visits are followed by classroom sessions to discuss observed activities and relate them to Maternal and Child Health and Crippled Children's programs. Faculty members participate in all field visits.

Maternal and Child Health 3c,d. Problems and Programs in Maternal and Child Health

Seminars. *Two two-hour sessions each week, third and fourth periods.* Dr. SCHMIDT, Dr. VALADIAN, and Staff of the Department.

Credit 4 units.

This course is focused on problems and issues in maternal and child health, services for handicapped children, related social problems, and available social services for mothers and children. Sessions are grouped around selected problems, each group including seminar discussion of programs, legislative developments, and research. There are also Faculty-accompanied field visits and student presentations based upon assigned readings.

Maternal and Child Health 4c. Welfare Programs and Their Relation to Public Health

Seminars. *One two-hour session each week, third period.* Staffs of the Departments of Maternal and Child Health and Health Services Administration.

Credit 1 unit.

This seminar includes presentation and discussion of the evolution of public welfare services, with emphasis on the development of public welfare philosophy, principles, and programs. Although it is primarily focused on public welfare in the United States, reference is made to contrasting patterns in other countries. Public attitudes as they affect public welfare policy are analyzed. The relationships of public welfare and public health and the complementary nature of their services are emphasized, including present and potential methods of cooperation. Emphasis is placed on the present strengths and limitations of welfare programs and anticipated further developments.

Maternal and Child Health 5d. Research Approach to Growth, Development and Health of the Child

Seminars. *Two two-hour sessions each week, fourth period.* Dr. VALADIAN and Dr. REED.

Credit 2 units.

This course deals with methods of obtaining and evaluating data on child growth, development, and health, and the construction of norms. Particular attention is paid to problems involved in the study of interrelationships between various aspects of the child's progress and between the child and his background and environment.

Illustrative material is used from the Longitudinal Study of Child Health and Development conducted in this Department since 1930 by Dr. Harold C. Stuart, Professor *Emeritus*, as well as data from other studies in this country and abroad.

Enrollment is subject to the approval of the Instructor.

Maternal and Child Health 6c. Adolescence and Youth: Sociological Concepts Related to Health Care

Lectures and seminars. *One two-hour session each week, third period.* Dr. TEELE and Staff of the Department.

Credit 1 unit.

This course is developed around a multi-disciplined approach to adolescent and youth behavior in the United States with material on sociopsychological theories and research in the field. Emphasis is placed upon a review of social science research on socialization practices, adolescent culture, and adolescent problems, including health problems. The aim of the course is to introduce the student to the apparent social and health consequences for youth of earlier familial influences with respect to health care, health attitudes, and child-rearing practices. In addition, the relationship of the structure of society to the growth and development of children and youth is considered.

Maternal and Child Health 17b,c,d,e. Tutorial Programs

Time to be arranged.

Credit 2 or more units.

Two types of tutorial programs are offered. One consists of work in an individual project under guidance; work is often based upon observation of health programs, study of health or vital records. A second type is based primarily upon directed reading and scheduled discussion with the appropriate faculty member; examples are: planning and evaluating health care services to mothers and children, technical assistance to developing countries in maternal and child health; the history, evolution, and future of school health. Similar tutorial programs are available in the developmental or social aspects of child health. Advance approval by the Head of the Department is required.

Maternal and Child Health 20. Research

Doctoral degree students may undertake research in Maternal and Child Health by arrangement with the Head of the Department.

Maternal and Child Health 30. Field Studies

1. January 26–31, 1970.

Credit 1 unit.

A field study in Puerto Rico is arranged in cooperation with the Department of Maternal and Child Health of the University of Puerto Rico, School of Medicine, Division of Preventive Medicine and Public Health. The work of the week is devoted mainly to an observation of Maternal and Child Health activities, including programs for handicapped children and family planning services.

Consent of the Head of the Department is required for admission to this course. *Enrollment must be made by the end of the first period.* (See page 182 for an estimate of the cost.) Preference is given to students whose special field of interest is Maternal and Child Health. Other students may enroll, to the limit of capacity.

2. Other field experiences may be taken for credit during the year as time permits.

3. Students whose special field of interest is Maternal and Child Health and who do not have sufficient previous experience will be encouraged to have a period of field study before registration. Field study may also be undertaken after the completion of the academic year in a program arranged by the Staff of the Department. No credit.

Department of Microbiology

Richard H. Daggy, s.b., s.m., ph.d., m.p.h., dr.p.h., Acting Head of the Department and Associate Dean of the Faculty for International Programs

Edward S. Murray, a.b., m.d., m.p.h., Professor of Microbiology

*Geoffrey Edsall, m.d., Professor of Applied Microbiology; *Superintendent, State Laboratory Institute, Massachusetts Department of Public Health*

†Samuel D. Bell, Jr., a.b., m.d., m.p.h., Associate Professor of Microbiology; *Assistant Physician, University Health Services*

Charlotte C. Campbell, s.b., Associate Professor of Medical Mycology

*Roger L. Nichols, a.b., m.d., Associate Professor of Applied Microbiology; *Director, Harvard and Aramco Trachoma Programs*

John H. Peters, s.b., m.d., Associate Professor of Microbiology

J. William Vinson, s.b., s.d. in hyg., Associate Professor of Microbiology

*Horace M. Gezon, a.b., m.d., Visiting Lecturer on Microbiology; *Professor and Chairman, Department of Pediatrics, Boston University School of Medicine and Director of Pediatrics, Boston City Hospital*

*George F. Grady, s.b., m.d., Lecturer on Applied Microbiology; *Assistant Director, Division of Biologic Laboratories, State Laboratory Institute, Massachusetts Department of Public Health*

*Morton A. Madoff, a.b., m.d., Lecturer on Microbiology; *Director, Division of Biologic Laboratories, State Laboratory Institute, Massachusetts Department of Public Health*

*Robert B. Pennell, s.b., s.m., ph.d., Visiting Lecturer on Immunology; *Director, Blood Research Institute, Inc.*

*Charles H. Rammelkamp, a.b., m.d., s.d. (hon.), Visiting Lecturer on Microbiology; *Professor of Medicine and Preventive Medicine, Case Western Reserve University School of Medicine*

*Martha D. Berliner, a.b., a.m., ph.d., Research Associate in Microbiology; *Assistant Professor of Biology, Simmons College*

*Charles E. O. Fraser, b.v.sc., m.r.c.v.s., d.t.v.m., s.m., ph.d., Research Associate in Microbiology; *Microbiologist, New England Regional Primate Research Center*

* Part-time in the School of Public Health.

† Part-time in the School of Public Health, full-time in Harvard University.

*Kenneth F. Girard, s.b., m.sc., ph.d., Research Associate in Microbiology; *Assistant Director, Division of Diagnostic Laboratories, State Laboratory Institute, Massachusetts Department of Public Health*

Marie Ebe Reca, dr.chem., Research Associate in Medical Mycology

Ann Hathaway, a.b., Assistant in Microbiology

*Leo Levine, s.b., Assistant in Microbiology; *Chief of Laboratory, Division of Biologic Laboratories, State Laboratory Institute, Massachusetts Department of Public Health*

Dorothy E. McComb, s.b., Assistant in Microbiology

*Teresa R. Rota, a.m., Assistant in Microbiology

*Judith M. Spielman, s.b., s.m. in hyg., Assistant in Microbiology

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Louis Weinstein, s.b., s.m., ph.d., m.d., *Lecturer on Infectious Diseases, Harvard Medical School; Professor of Medicine, Tufts University School of Medicine*

Ruth B. Kundsin, a.b., a.m., s.d. in hyg., *Research Associate in Bacteriology, Department of Surgery, Harvard Medical School; Associate Staff Member, Peter Bent Brigham Hospital*

The Department of Microbiology is concerned with public health as it relates to diseases of microbial origin, more specifically those of bacterial, bedsonial, rickettsial, viral or mycotic etiology. Its three principal functions are:

1. To instruct in the basic and current ecologic concepts of these diseases and their prevention and control in a manner that will evoke a recognition of the ways in which change in political, social and economic patterns of populations induce changes in the relative prevalence of certain types of diseases at any particular time in history, i.e., the dynamics of microbial populations associated with the movements and activities of man in addition to the more traditional "host-parasite" interrelationships, *per se.*

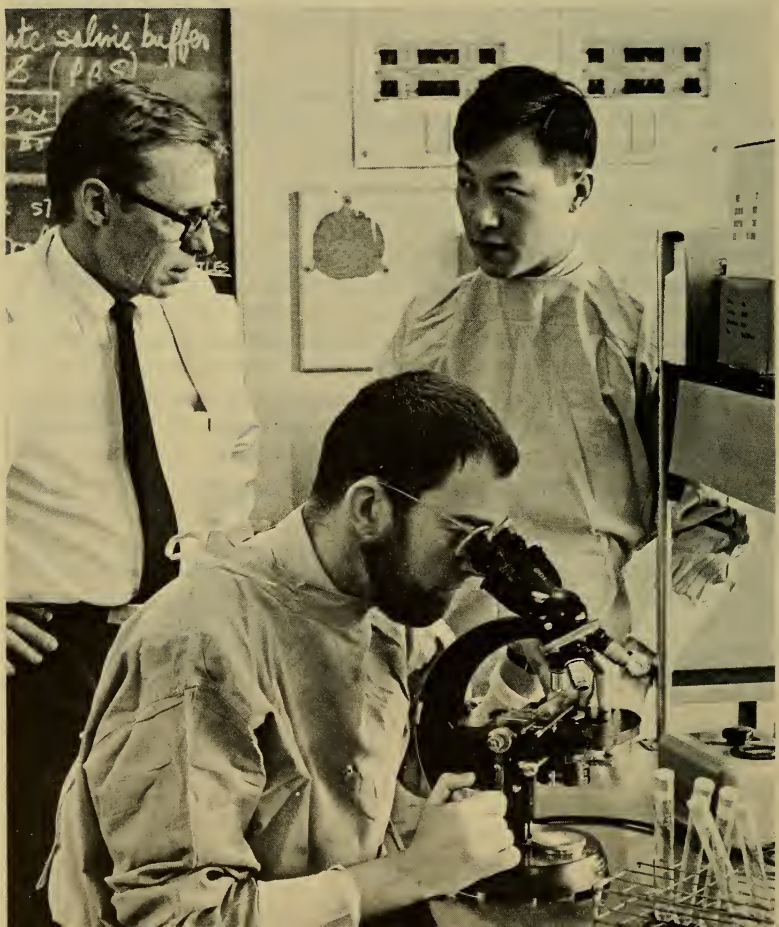
2. To enlarge on the basic and current concepts of certain of these diseases and their causative agents in an active program of research in both laboratory and field investigations, and by means of the foregoing.

3. To provide an atmosphere of curiosity and guidance in which younger investigators profitably undertake further research in the field of infectious diseases.

The basic course, Microbiology-Tropical Public Health 1a,b, presents selected fundamental aspects of microbiology and parasitology, as well as the more recent advances in factual information essential to a general understanding and comprehensive approach to resolving infectious disease problems in the field of public health.

The more advanced courses of the Department are expected to lead to a better understanding of the broad range of problems in infectious disease, with particular emphasis on immunology as the fundamental approach to analyzing both the diseases and their etiologic agents. The individual who proposes to specialize in microbiology and undertake original research in this field also has the opportunity to work in close association with a member of the staff on a problem of his choice from any one of the variety of areas listed under Microbiology 17.

The State Laboratory Institute of the Massachusetts Department of Public Health has a close affiliation with the School of Public Health, and the senior staff members of the Institute hold appointments in this Department. The Institute is actively involved in medical and public health diagnostic microbiology; in the development, production and evaluation of serums, vaccines, blood fractions and other biologic products; in field studies on arboviruses in



the Massachusetts area; in screening for congenital metabolic disorders; in immunologic surveillance of selected population groups; and in evaluating procedures and performance of local clinical and public health laboratories. The changing responsibilities, problems and developments of the present-day public health laboratory are thus brought actively into the teaching and research program of the Department.

Training programs supported by the National Institutes of Health are available to assist qualified applicants who desire training in infectious diseases or in the fields covered by the State Laboratory Institute.

Microbiology and Tropical Public Health 1a,b. Ecology and Epidemiology of Infectious Diseases

Lectures, seminars, and laboratory exercises. *Three one-hour sessions and one three-hour session each week, first period; one one-hour and two two-hour sessions each week, second period.* Dr. WELLER, Associate Professor CAMPBELL, and Staffs of the two Departments.

Credit 4 units.

Recommended as part of basic core curriculum for Master of Public Health candidates.

This course is designed to provide an integrated presentation of information on communicable diseases of major public health importance. The exercises include discussions of the present status of infectious diseases in temperate and tropical climates, of procedures for their control at the community level, and of techniques available for study of microorganisms and parasites with special reference to recently developed methods which have opened a new era in microbiology. Coverage of etiologic agents includes the protozoa, helminths, viruses, rickettsiae, spirochetes, fungi, and bacteria. To achieve a comprehensive approach, subjects of public health importance and of diverse etiologies, such as the acute respiratory diseases, are considered in an integrated manner. Other important entities, such as malaria and schistosomiasis, are selected for emphasis as case examples to illustrate epidemiological concepts and the elements of control.

The course assumes a medical school background and an understanding of the pathogenesis of disease produced by infectious agents in the affected individual. It is concerned primarily with the ecologic factors affecting transmission of infectious agents in the human community, with assessment of public health significance of representative infectious diseases, and with approaches to their prevention and control. In the laboratory, the student is not expected to acquire technological skills, but rather an understanding of the potentialities as well as of the limitations of pertinent public health laboratory procedures.

Microbiology and Tropical Public Health 2b. Current Research in Infectious Diseases

Seminars. *One two-hour session each week, second period.* Dr. CHERNIN, Dr. VINSON, and Staffs of the Departments of Microbiology and Tropical Public Health.

Credit 1 unit.

This course is required of all those concentrating in Microbiology or Tropical Public Health. Papers on topics of general interest are selected from current periodicals and critically reviewed as to soundness of experimental design, validity and significance of results and conclusions, organization of manuscripts and clarity of presentation.

Enrollment of nondepartmental students subject to approval of Instructor.

Microbiology 3c. Clinical Problems in Infectious Diseases

Lectures and clinics. Given at the New England Center Hospital. *One two-hour session each week, third period.* Dr. WEINSTEIN.

Credit 1 unit.

Problems of diagnosis, treatment and control of the common acute communicable diseases of temperate climates, as well as discussions of infectious diseases that are usually not considered communicable.

Microbiology 4c. Public Health and Laboratory Aspects of Infectious Diseases of Microbial Origin

Seminars and laboratory exercises. *Two three-hour sessions and one one-hour session each week, third period.* Dr. MURRAY and Staff of the Department.

Credit 2.5 units.

This course is an amplification of Microbiology-Tropical Public Health 1a,b and is oriented to the epidemiologist as well as to the microbiologist. The exercises are directed to the further study of infectious diseases of bacterial, rickettsial, viral and mycotic origin and to the laboratory procedures by which infections caused by these agents are identified.

Laboratory procedures include those used in the isolation and identification of bacteria, spirochetes, and fungi of major public health importance; cell culture and embryonated egg inoculation technics for isolation and characterization of viruses and rickettsiae; serologic technics such as complement fixation, neutralization, agglutination and immunofluorescence; and finally immunochemical procedures such as column chromatography, gel diffusion, and immunoelectrophoresis.

In seminars, the comprehensive approach is emphasized in resolving outbreaks of infectious diseases. Discussions stress the potentialities and limita-

tions of the various laboratory technics employed in both laboratory and field studies.

Enrollment is limited and subject to the approval of the instructor.

Microbiology and Tropical Public Health 6d. Tuberculosis

Seminars. *One two-hour session each week, fourth period.* Dr. Koch-Weser and Associate Professor Campbell.

Credit 1 unit.

The purpose of this course is to provide an understanding of the ecology and the public health significance of tuberculosis which continues to be a worldwide problem of major importance. Various features of tuberculosis are discussed; particularly the microbiologic, medical, social, and economic aspects.

The significance of differentiating diseases often confused with tuberculosis, especially the respiratory mycoses and "atypical" mycobacterioses, is also considered. These discussions are based on selected reports in the literature and experiences of students and Faculty members in developed and developing nations with tuberculosis programs and control.

Visits to local tuberculosis hospital laboratories are arranged upon request.

Microbiology 7a. Fundamentals of Immunology

Seminar and laboratory exercises. *Three one-hour sessions and three two-hour laboratory sessions each week, first period.* Dr. Peters.

Credit 3.5 units.

The purpose of this course is to explore in depth fundamental immunochemical techniques and principles through active student participation in all phases of seminars, conferences, demonstrations and laboratory exercises. Although understanding of basic principles will be emphasized, special attention is given to the application and usefulness of immunochemical methodology in the study of various microbiologic and biologic phenomena.

This course is intended primarily for students in the Master of Science in Hygiene and doctoral programs, and for postdoctoral trainees interested in immunologic methods of relevance to their investigations.

Enrollment subject to the approval of the Instructor.

Microbiology 9c. Public Health Aspects of Immunology

Seminars and laboratory exercises. *Two one-hour sessions and one two-hour laboratory session each week, third period.* Dr. Peters.

Credit 2 units.

This course is intended primarily for those who wish to review and explore fundamental aspects of immunology of especial pertinence to problems in public health in general and infectious disease in particular. This is accom-

plished through active participation in an integrated seminar, conference, and laboratory program. Such major areas as the nature of cellular and microbial antigens, innate immunity and resistance to infection, host-parasite relationships, structure and functions of immunoglobulins, and antibody formation will be covered. Special attention is also given to the relationship and applicability of immunology to such areas as diagnostics, immunofluorescence, epidemiology and biologic problems in general.

Enrollment subject to the approval of the Instructor.

Microbiology and Tropical Public Health 11d. Medical Mycology

Laboratory, conferences and field exercises. *One three-hour session and three hours of individual laboratory work each week, fourth period.* Associate Professor CAMPBELL.

Credit 2 units.

This course concerns principles and techniques essential to the study of pathogenic fungi of medical and public health importance. It consists of conferences, lectures and laboratory, and field work under tutorial supervision. Emphasis is placed on the isolation of mycotic agents from cases in humans and sources in nature by *in vitro* and *in vivo* cultivation, and on identification by morphologic, biochemical and histologic characteristics. Procedures for soil baiting, soil sampling, skin and serologic tests, as adjuncts in establishing indirect or presumptive diagnosis and in defining geographic distribution and areas of high endemicity, are integral aspects of the course.

The course is designed to prepare graduates for laboratory research or field studies in medical mycology.

Enrollment is subject to the approval of the Instructor.

Microbiology 12c. Role of the Laboratory in Public Health Programs and Policies

Seminars. *One two-hour session each week, third period.* Dr. EDSALL, Dr. MADOFF, Dr. GIRARD and Dr. GRADY.

Credit 1 unit.

This course deals with the policies and problems which concern the present-day public health laboratory. It includes an examination of the principles under which immunizing agents are originated, prepared, evaluated, used, and monitored; problems in evaluation of reactions to immunizing agents, in judging the uses, limitations, and potential role of diagnostic laboratory services; the role of the new services such as tests for congenital metabolic disorders, rheumatic fever prevention programs, mass screening, serologic surveillance programs, and other related topics selected in accordance with the requirements and interests of the class.

Microbiology 13d. Intracellular Microorganisms Pathogenic for Man

Laboratory exercises and seminars. *Two three-hour sessions each week, fourth period.* Dr. Bell and Staff of the Department.

Credit 2 units.

This course consists of laboratory sessions and seminars which provide an understanding of the techniques available for study of the growth and the characteristics of representative strains of rickettsiae, bedsoniae, and viruses which are important human pathogens. Each student performs the procedures for identification and characterization of unknown pathogens under supervision of the Staff.

Prerequisite: Microbiology 4c or equivalent.

Enrollment is limited to ten students with prior approval of the Instructor.

Microbiology and Tropical Public Health 14c,d. Case Studies in Epidemiology of Infectious Disease

Seminars and laboratory exercises. *One two-hour session each week, third and fourth periods.* Dr. Bell.

Credit 2 units.

This course is constructed to provide experience in solving epidemiologic problems in communicable disease. Actual epidemics of such disease as tuberculosis, hepatitis, arbovirus, and smallpox are solved on paper in classroom laboratory-type sessions with emphasis on a commitment by the participants at each stage of the solution.

Microbiology 15d. Problems in Medical Bacteriology

Seminars and laboratory demonstrations. *One three-hour session each week, fourth period.* Associate Professor Campbell, Staff of the Department and Visiting Lecturers.

Credit 1 unit.

This course reviews recently developed laboratory procedures pertinent to the isolation and identification of pathogenic bacteria of primary concern to public health. In addition to demonstrations, epidemiologic problems are assessed in seminars. These relate specifically to the role of the laboratory in the diagnosis and control of epidemics due to staphylococci, streptococci, neisseriae, mycobacteriae (including the "atypicals" and *Mycobacterium leprae*), salmonellae, shigellae, vibrios, leptospires and treponemata, mycoplasma, and other microbial pathogens of long recognized and emerging importance.

Microbiology 17a,b,c,d. Introduction to Research in Microbiology

Time and credit to be arranged. Staff of the Department.

Enrollment requires the consent of the staff member who is to be responsible for supervision of the research. The various subject areas are listed below by category.

17.1 Pathogenic Fungi, Associate Professor CAMPBELL.

Biological, immunological and chemical characterization of the antigenic mosaic of *Histoplasma capsulatum* and other respiratory mycotic agents, involving electrophoretic and other recently developed immunologic procedures; serologic diagnosis of the respiratory mycoses including complement fixation, immunodiffusion and other serologic tests; basic studies on the agents, i.e., nutritional requirements, physiology, dimorphism, and morphogenesis.

Microorganisms available for study: an extensive collection of all pathogenic fungi, especially those producing systemic disease.

17.2 Rickettsiae, Dr. MURRAY and Dr. VINSON.

The qualified student may elect to study the biologic and immunologic characteristics of rickettsiae in the laboratory as well as to be associated with ongoing research in the field. Microorganisms under study in the Department include the rickettsiae of typhus fever, Rocky Mountain spotted fever, scrub typhus and trench fever. Biologic characteristics of these organisms are being studied in animals, chick embryos, and cell cultures. The IgG, IgM and IgA immunoglobulin response to these organisms are under investigation utilizing various immunochemical and serologic technics. Colonies of the human body louse and oriental rat flea are maintained in the laboratory for xenodiagnosis and transmission studies, and for studying host-parasite relationships and methods for control of anthropods. Rickettsial field projects are in progress in Yugoslavia, Tunisia, Mexico and Cape Cod, Massachusetts.

17.3 Bedsoniae, Dr. BELL, Dr. MURRAY, Dr. NICHOLS and Dr. PETERS.

Active research is presently being conducted on the various members of the bedsoniae including trachoma, inclusion conjunctivitis, psittacosis, lymphogranuloma venereum and a wide vareity of agents from nonhuman sources. There are numerous unsolved problems in this relatively new field and qualified students are welcome to undertake laboratory and occasionally field investigations.

17.4 Viruses, Dr. BELL.

Isolation and identification of representative viruses by use of tissue cultures, animal inoculation, and serologic techniques.

17.5 Immunochemical Methods, Dr. PETERS.

Experiments with immunofluorescence, chromatography, immunoelectro-

phoresis, ultracentrifugation, labelled isotopes and other techniques are being applied to research on microorganisms and mechanisms of hypersensitivity.

17.6 Public Health Laboratory, Dr. Edsall and Associates at the State Laboratory Institute.

Students may participate in the research at the Institute in public health microbiology, applied immunology, development and study of vaccines, immune globulins and other plasma fractions, etc., in arbovirus ecology, epidemiology, recognition of genetic biochemical defects, and related areas.

Microbiology 20a,b,c,d. Research in Microbiology

Qualified doctoral candidates, research fellows, and full-time special students may register for Microbiology 20 to undertake original research in virology, rickettsiology, mycology, bacteriology, immunology, or in one of the disciplines under study at the State Laboratory Institute. A number of the current research activities of the Department of Microbiology are indicated under Course 17. Inquiries as to specific research opportunities should be addressed to the Head of the Department.

Department of Nutrition

Fredrick J. Stare, s.b., s.m., ph.d., m.d., a.m. (hon.), s.d. (hon.), d.sc. (hon.), Professor of Nutrition *and* Head of the Department

D. Mark Hegsted, s.b., s.m., ph.d., a.m. (hon.), Professor of Nutrition

Jean Mayer, b.a., b.sc., m.sc., ph.d., d.sc., a.m. (hon), Professor of Nutrition *and* Lecturer on the History of Public Health.

Stanley N. Gershoff, a.b., s.m., ph.d., Associate Professor of Nutrition

Robert P. Geyer, s.b., s.m., ph.d., Associate Professor of Nutrition

Bernard Lown, s.b., m.d., Associate Professor of Cardiology in Public Health

Robert B. McGandy, a.b., m.d., m.p.h., Associate Professor of Nutrition

Carl C. Seltzer, a.b., ph.d., Senior Research Associate in Biological Anthropology

*Harry N. Antoniades, b.s., ph.d., Assistant Professor of Biochemistry; *Senior Investigator, Blood Research Institute, Inc.*

Clifton A. Baile, s.b., ph.d., Assistant Professor of Nutrition

Manuel G. Herrera-Acena, a.b., m.d., Assistant Professor of Medicine

*Harben J. Boutourline-Young, m.b., b.s., d.c.h., m.d., Research Associate in Human Growth and Development

*Sam L. Clark, Jr., m.d., Research Associate in Anatomy; *Professor and Head, Department of Anatomy, University of Massachusetts School of Medicine*

*Hector A. Castellanos, b.s., m.d., Research Associate in Nutrition; *Professor of Biological Sciences, University of San Carlos, Medical School, Guatemala*

Francisco Cobos, m.d., Research Associate in Child Psychiatry

Johanna T. Dwyer, s.b., s.m., s.m. in hyg., s.d. in hyg., Research Associate in Nutrition

Zvi Glick, b.sc., m.s., ph.d., Research Associate in Nutrition

Kenneth C. Hayes, a.b., d.v.m., ph.d., Research Associate in Nutrition

Agnes M. Huber, b.sc., ph.d., Research Associate in Nutrition

Michael D. Klein, a.b., m.d., Research Associate in Medicine

Bernard D. Kosowsky, a.b., m.d., Research Associate in Medicine

Harry L. McCombs, s.b., m.d., Research Associate in Pathology

* Part-time in the School of Public Health.

*Joseph M. Miller, A.B., M.D., M.P.H., Research Associate in Medicine; *Senior Associate in Medicine, Peter Bent Brigham Hospital*

Nasser S. Nejad, A.B., PH.D., Research Associate in Nutrition

Dennis J. Sabo, S.B., S.M., PH.D., Research Associate in Nutrition

*Donald W. Thomas, A.B., A.M., PH.D., Research Associate in Psychology; *Assistant Professor of Psychology, Simmons College*

Warren J. Arter, M.B.,B.S., Research Fellow in Nutrition

Isaac Barr, M.D., Research Fellow in Nutrition

Timothy E. Guiney, S.B., M.D., Research Fellow in Nutrition

Robert S. Hattner, S.B., M.D., Research Fellow in Nutrition

Philip I. Hershberg, B.E.E., M.E.E., M.D., Research Fellow in Nutrition

Hans R. Jenzer, M.D., Research Fellow in Nutrition

Jay S. Kerzner, A.B., M.D., Research Fellow in Nutrition

Kenneth W. Samonds, S.B., S.M., PH.D., Research Fellow in Nutrition

Marcel Seiler, M.D., Research Fellow in Nutrition

Jack B. Taylor, S.B., M.D., Research Fellow in Nutrition

Marshall A. Wolf, A.B., M.D., Research Fellow in Nutrition

Dorothy Bruno, S.B., Assistant in Nutrition

Ethel J. Duffett, S.B., Assistant in Nutrition

Thomas P. Faherty, Assistant in Microscopy

Jelia C. Witschi, S.B., S.M., Assistant in Nutrition

James H. Shaw, B.A., S.M., PH.D., A.M. (hon.), *Professor of Nutrition, Harvard School of Dental Medicine*

Daniel S. Bernstein, A.B., M.D., *Assistant Professor of Medicine, Harvard Medical School*

Ronald D. Hunt, S.B., D.V.M., *Research Associate in Pathology, Harvard Medical School*

Evaline E. S. Keeley, A.B., M.D., *Associate in Pathology, Harvard Medical School*

The Department of Nutrition is concerned with basic and applied investigations in the science of nutrition in the areas of biochemistry, physiology, pathology, and psychology. Many of these are oriented toward problems of contemporary public health importance, such as cardiovascular diseases, obesity, and osteoporosis. The Department also has programs dealing with general nutritional and health problems in various countries in South America, Africa, and Asia.

In addition to the courses available in the School of Public Health, students may take graduate courses in the other Schools of Harvard University and at the Massachusetts Institute of Technology. Thus, a program leading to the Doctor of Science degree might include courses in nutrition, biochemistry, biostatistics and epidemiology, physiology, and bacteriology, as well as advanced courses in these and related fields, such as organic and physical chemistry and biology. Appropriate programs are available for individuals whose interests lie in community nutrition rather than in laboratory nutrition and biochemistry.

Candidates for the Master of Public Health degree who elect to concentrate in Nutrition are normally expected to take the following courses in addition to satisfying the formal course requirements for the degree:

Nutrition 1a and at least one other course offered by the Department of Nutrition.

Nutrition 1a. Public Health Nutrition

Lectures. *One two-hour session each week, first period.* Dr. Mayer, Dr. Gershoff, and Dr. McGandy.

Credit 1 unit.

Recommended as part of basic core curriculum for Master of Public Health candidates.

This course deals with nutrition and the application of nutrition programs to problems of human health in overnourished and undernourished populations of highly industrialized and developing areas of the world. Subjects to be discussed will include obesity, atherosclerosis and coronary heart disease, malnutrition in the United States, methods for assessing nutritional status, and protein-calorie malnutrition.

Nutrition 2b,c,d. Departmental Seminar

Seminars. *Two one-hour sessions each week, second, third and fourth periods.* Dr. Baile and Staff of the Department.

Credit 3 units.

Students are expected to summarize and criticize recent publications on assigned topics in nutrition. Attention is placed on validity of experimental designs in nutritional research. Topics include the biochemical, physiological, psychological, and sociological aspects of nutrition.

Nutrition 3c,d. Advanced Topics in Nutrition

Lectures, discussions and required reading. *One two-hour session each week, third period; two two-hour sessions each week, fourth period.* Dr. Hegsted, Dr. Mayer and Dr. Gershoff.

Credit 3 units.

The nutritional aspects of metabolism of carbohydrates, fats, proteins, vitamins, and essential minerals are considered in detail. Mechanisms of regulation and behavioral aspects of food and fluid intake, calorimetry, genetic factors in nutrition, comparative requirements of various species are examined.

This course is intended primarily for students majoring in nutrition but can be taken by other adequately prepared students by the consent of the Instructors.

Nutrition 4c,d. Laboratory Techniques

Lectures and demonstrations. *One two-hour session each week, third and fourth periods.* Dr. Geyer and Dr. Antoniades.

Credit 2 units. Additional credits can be arranged for those desiring extra laboratory instruction.

This course is a survey of methods pertinent to laboratory research. The material covered includes biophysical and chemical techniques. Students participate in laboratory exercises on such general topics as chromatography, spectroscopy, microbiological assay, manometric measurements, and purified diet techniques. They are then instructed in the actual laboratory procedure pertaining to these techniques.

Prerequisite: A basic course in biochemistry.

Enrollment is subject to the approval of the Instructor.

Nutrition 5d. Nutritional Surveys

Lectures, discussions and laboratory exercises. *One two-hour session each week, fourth period.* Dr. Gershoff and Dr. McGandy.

Credit 1 unit.

Methods of obtaining dietary information, principles of nutritional surveys; assessment of nutritional status in public health programs and clinical research are examined and discussed. Laboratory work consists of practical exercises in evaluating diets and surveys.

Nutrition 6c,d. Nutritional Aspects of Human Disease

Lectures, discussions and demonstrations. *One two-hour session each week, third and fourth periods.* Dr. Herrera-Acena and Dr. Lown.

Credit 2 units.

The 1969–70 topic will be atherosclerosis. The course considers recent developments in coronary artery disease with special focus on sudden death, coronary death in the community, coronary and precoronary care, diet, exercise, and newer concepts of pathogenesis.

Nutrition 7c. International Nutrition Policy and Programs

Seminars and discussions. *One two-hour session each week, third period.* Dr. STARE and Staff of the Department.

Credit 1 unit.

This course is designed to cover food and nutrition policy in developing countries. The planning, execution, and evaluation of applied nutrition programs will be described. The need for coordination of efforts by the various government ministries or departments, including those of agriculture, education, economics, health and community development, will be stressed. The course includes discussion of such topics as the place of food and nutrition programs in relation to economic development; education and training in nutrition; the importance of social and cultural factors; methods of increasing the use of protein-rich foods; the role of FAO, WHO, UNICEF, and the voluntary agencies; action in case of famine; research and investigation as a tool for preventive action; the place of nutrition rehabilitation centers and MCH services; and the integration of nutrition with other projects of disease control in tropical areas.

Enrollment is limited and is subject to the approval of the Instructor.

Nutrition 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Individual work, under direction, may be arranged for students at the master's level. This may include laboratory studies or projects in applied nutrition.

Nutrition 20. Research

Time and credit to be arranged.

Facilities are available for students at the doctoral level to do advanced work in nutrition along the lines of fundamental research or applied nutrition in public health and medicine. Areas currently receiving intensive and comprehensive study in the Department are as follows:

The effect of nutrition and other environmental factors on the etiology of heart disease in man; nutrition education; fluoride in human nutrition as a preventive for tooth decay and osteoporosis; cooperative international researches in nutrition. (Dr. STARE)

The nutritive value of proteins and protein requirements; dietary effects on the metabolism of cholesterol in animals and man; the influence of diet on the metabolism of adipose tissue; nutritional requirements for calcium and for bone formation. (Dr. HEGSTED)

Neurophysiological, behavioral, and metabolic aspects of the regulation of food and fluid intake in animals; experimental obesity; anthropological,

metabolic, and behavioral studies of obesity in children and adolescents; psychological aspects of nutrition in man. (Dr. MAYER)

Lipid metabolism in tissue culture cells; polyvalent metal metabolism in soft tissue; effects of CO_2 deprivation on tissue culture cells. (Dr. GEYER)

The effects of nutritional deficiencies on endocrine metabolism; the etiology of urolithiasis in experimental animals and man; vitamin metabolism; interrelationships between nutrition and endocrine function. (Dr. GERSHOFF)

Coronary artery disease; etiology of sudden death; derangements of the heart beat; exercise physiology; electrolyte metabolism. (Dr. LOWN)

Clinical and experimental studies on circulating lipids and atherosclerosis. (Dr. MCGANDY)

Protein isolation and characterization; hormone biochemistry and metabolism. (Dr. ANTONIADES)

Endocrine, nutritional, and metabolic aspects of diabetes and hyperlipidemia (Dr. HERRERA-ACENA)

Hormonal, metabolic, and central nervous system functions in energy balance regulation. (Dr. BAILE)

Admission is limited and is subject to the approval of the Instructor.

Department of Physiology

James L. Whittenberger, s.b., m.d., a.m., (hon.), James Stevens Simmons Professor of Public Health, Professor of Physiology *and* Head of the Department

*Ross A. McFarland, a.b., ph.d., s.d. (hon.), Daniel and Florence Guggenheim Professor of Aerospace Health and Safety

Jere Mead, s.b., m.d., Professor of Physiology

Mary O. Amdur, s.b., ph.d., Associate Professor of Toxicology

†Benjamin G. Ferris, Jr., a.b., m.d., Associate Professor of Environmental Health and Safety; *Director of Environmental Health and Safety, University Health Services*

John B. Little, a.b., m.d., Associate Professor of Radiobiology

Sheldon D. Murphy, s.b., ph.d., Associate Professor of Toxicology

John M. Peters, s.b., m.d., m.p.h., s.d. in hyg., Associate Professor of Occupational Medicine

William L. Claff, a.b., m.b.a., Lecturer on Administration *and* Assistant Dean for Financial Affairs

Joseph D. Brain, a.b., s.m., s.m. in hyg., s.d. in hyg., Assistant Professor of Physiology

Stanley V. Dawson, s.b., s.m., s.d. in hyg., Assistant Professor of Environmental Health Engineering

John D. Dougherty, a.b., m.d., m.p.h., s.d. in hyg., Assistant Professor of Environmental Health and Safety

Frederic G. Hoppin, Jr., a.b., m.d., Assistant Professor of Physiology

David E. Leith, a.b., m.d., Assistant Professor of Physiology

Ronald M. Pickett, a.b., a.m., ph.d., Assistant Professor of Experimental Psychophysiology

Howard W. Stoudt, a.b., a.m., ph.d., s.m. in hyg., Assistant Professor of Physical Anthropology

Dwight W. Underhill, b.e., s.m. in hyg., s.d. in hyg., Assistant Professor of Environmental Health Engineering

* Part-time in the School of Public Health.
† Part-time in the School of Public Health, full-time in Harvard University.

*Charles A. Berry, A.B., M.D., M.P.H., Visiting Lecturer on Aerospace Medicine; *Director of Medical Research and Operations, NASA Manned Spacecraft Center*

*Hervey B. Elkins, A.B., PH.D., Visiting Lecturer on Industrial Toxicology; *Director, Massachusetts Division of Occupational Hygiene*

*David W. Fassett, A.B., M.D., Visiting Lecturer on Occupational Medicine; *Director, Laboratory of Industrial Medicine, Eastman Kodak Company*

*Harry Heimann, S.B., M.D., Visiting Lecturer on Occupational Medicine; *Research Professor of Community Medicine (Environmental Medicine), Mt. Sinai School of Medicine, New York*

Edward J. Burger, B.SC., M.D.C.M., M.I.H., S.D. IN HYG., Research Associate in Physiology

Roland C. Moore, A.B., A.M., PH.D., Research Associate in Occupational Safety

Thomas J. Crowley, S.B., S.M., Research Associate in Environmental Health and Safety

Francis X. Kamienski, S.B., A.M., PH.D., Research Associate in Toxicology

Raymond L. H. Murphy, Jr., S.B., M.D., M.P.H., S.D. IN HYG., Research Associate in Occupational Medicine; *Project Coordinator, Medical Station, Logan Airport, Boston*

*John M. Tyler, A.B., M.D., Research Associate in Physiology; *Chief of Professional Services, Lemuel Shattuck Hospital*

Kevin E. Finucane, M.B., B.S., M.R.A.C.P., Research Fellow in Physiology

Daniel A. Garcia, D.D.S., M.D.S., S.M. IN HYG., Research Fellow in Radiobiology

Alejandro E. Grassino, M.D., Research Fellow in Physiology

Thomas J. Hixon, S.B., A.M., PH.D., Research Fellow in Physiology

Gary L. Huber, S.B., S.M., M.D., Research Fellow in Physiology

Gavriel Lewinsohn, M.D., Research Fellow in Physiology

René L. Peslin, M.D., Research Fellow in Physiology

Peter D. Phelan, B.SC., M.B.,B.S., M.D., Research Fellow in Physiology

Diane E. Olson, A.B., S.M., Assistant in Psychophysiology

Robert G. Monroe, A.B., M.D., *Assistant Professor of Pediatrics, Harvard Medical School*

Mary Ellen Beck Wohl, M.D., *Assistant Professor of Pediatrics, Harvard Medical School*

The Department of Physiology has interests which include physiology as a basic medical science. The Department's concerns, however, extend beyond pure physiology to encompass a broad spectrum of environmental health

problems for which physiologic and biochemical knowledge and techniques are necessary tools. The biologic effects of air pollutants, of pesticides, and of radiation are typical problems that have been central to the Department's interests. Such broad problems require the insights of many specialties and the personnel of the Department reflect this multi-disciplinary approach. The staff of the Department includes physicians, physiologists, psychologists, physical anthropologists, health and safety specialists, engineers, toxicologists, and specialists in radiobiology, occupational medicine and aerospace. Students and Research Fellows come with similarly varied backgrounds.

A major objective of the Department is to provide students with basic information on the relationship of man to his physical and chemical environment. The course Environmental Health Interdepartmental 1a,1b introduces M.P.H. candidates to fundamental concepts regarding the measurement of both the quality of the environment and its impact on man. These concepts are examined in detail in specialized courses such as Environmental Physiology, Principles of Toxicology, Radiation Biology, and Human Factors in Occupational Performance and Safety. Specific research projects of members of the Department offer students an opportunity to gain experience in, and to develop a capacity for, critical evaluation of research methods. Qualified individuals may enroll in a program leading to the Doctor of Science degree.

The research programs include topics such as cellular effects of ionizing radiation, mechanisms of carcinogenesis and mutagenesis, toxic interactions of particles and vapors, inhalation toxicology, pesticide metabolism and toxicity, enzyme induction, comparative respiratory physiology, and the deposition and clearance of particles in the respiratory tract. Other research areas are the elastic properties of the lungs and chest wall, mechanisms of flow limitation, role of lung surfactant, human factors in transportation safety, causation of chronic non-specific respiratory disease, exercise and work physiology and factors involved in fitting the machine and work environment to the capabilities of human performance.

International interests of the Department involve attempts to determine the causation of chronic nonspecific respiratory diseases by comparing results obtained by similar methods in various countries.

Physiology 3a,b. Human Physiology

Lectures and conferences. *Two two-hour sessions each week, first and second periods.*

Laboratory and demonstrations. *One two-hour session each week, first and second periods.* Dr. Brain and Staff of the Department.

Credit 5 units.

This course presents basic physiological processes which characterize living cells, organs, organ systems, and whole organisms as they respond to a

changing environment. Topics covered include cell structure and physiology, genetics, circulation, gas exchange, endocrinology, neurophysiology, fluid and solute exchange, and general pathology. The laboratory work and demonstrations will be correlated with the lectures and are intended to give students some experience with the problems and satisfactions of observing living systems.

Prerequisites: College courses in physics, chemistry, and mathematics; or permission of the Instructor. This course is suitable for students who lack a background in physiology or biology.

Physiology 4c. Environmental Physiology

Lectures and conferences. *One two-hour session each week, third period.* Dr. LEITH and Staff of the Department.

Credit 1 unit.

This course deals with fundamental principles in the relations between organisms and their physical, chemical, and biological environments. Response, adaptation, performance, and tolerance limits are considered. Application of these principles in man's affairs is discussed in the fields of exercise, altitude and diving, high and low temperatures, and humidity.

Prerequisite: Master of Science in Hygiene candidates who wish to take this course must have had Physiology 3a,b or the equivalent.

Physiology 5c,d. Principles of Toxicology

Lectures and laboratory work. *Two two-hour sessions each week, third period; one one-hour session and one two-hour session each week, fourth period.* Dr. AMDUR and Dr. MURPHY.

Credit 4 units.

A short written report is required in this course.

This course presents an introduction to the effects of toxic chemical agents on living organisms with particular reference to the fundamental principles and experimental techniques used in assessing toxicity. Several classes of toxic agents are studied with respect to mechanisms of action on living tissue, functional changes resulting from exposure, and methods of evaluating the damage produced.

Prerequisite: Physiology 3a,b or equivalent.

Physiology 6d. Special Topics in Respiratory Physiology

Lectures. *One two-hour session each week, fourth period.* Dr. MEAD and Staff of the Department.

Credit 1 unit.

This course covers special topics in respiratory physiology, according to the interest of the students. It is intended primarily for students in the avia-

tion medicine program. Other students who are specializing in environmental health may enroll with the consent of the Instructor.

Physiology 7c,d. Radiation Biology

Lectures. *Three one-hour sessions each week, third and fourth periods.*

Laboratory. *One two-hour session each week, third and fourth periods.* Dr. Little.

Credit 5 units.

Two additional hours each week of individual laboratory work and written reports are required in this course.

This course deals with the biological effects of ionizing radiation and is divided into two parts, cellular and mammalian radiation biology. Included in the first will be a discussion of elementary target theory, radiation chemistry, effects on macromolecules, cellular and chromosomal effects, and recovery processes. The second part covers the acute and long-term effects of radiation with emphasis on man, as well as a discussion of environmental

sources of radiation and the characteristics of internal and external human exposure.

Prerequisite: Physiology 3a,b, or equivalent.

Physiology 8a,b. Seminar in Toxicology

Lectures and seminars. *One two-hour session each week, first and second periods.* Dr. MURPHY and Dr. AMDUR.

Credit 2 units.

The purpose of this course is to acquaint students with current problems in toxicologic research and to stimulate in-depth discussion of mechanisms of action and metabolism of toxic chemicals. Following a series of introductory lectures on problems in toxicology, students will be expected to review the literature on an assigned topic in basic toxicologic research and to present a critical summary for class discussion. Broad topic areas will include metabolism of toxic chemicals, target sites and mechanisms of toxic action, structure-activity relationships, toxicologic interactions and functional-morphological relationships. Two or three hours per week of outside reading will be required. Consent of the Instructor is required.

Physiology 10c,d. Topics in Physiology

Lectures and seminars. *One two-hour session each week, third and fourth periods.* Dr. BRAIN, Dr. DAWSON and Staff of the Department.

Credit 2 units.

This course will explore some of the physical laws which form the foundations of physiology. Also emphasized will be systems physiology, i.e., the dynamic properties of interacting organs and tissues. After some introductory lectures on diffusion, flow, pressure, temperature and energy, students will be expected to apply basic control processes and physical laws to systemic functions. Two or three hours per week of outside reading or problems will be required. The contents of the course will vary from year to year and hence it may be taken more than once. Consent of the Instructor is required.

Prerequisite: Physiology 3a,b or equivalent.

Physiology 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Opportunities are provided for tutorial work at a master's degree level in the fields of respiratory physiology, toxicology, and occupational medicine.

Physiology 20. Research

Doctoral candidates and other properly qualified students may undertake laboratory or field research by arrangement with the Head of the Department.

Department of Sanitary Engineering

HAROLD A. THOMAS, JR., S.B., S.M., S.D., Gordon McKay Professor of Civil and Sanitary Engineering

J. CARRELL MORRIS, S.B., A.M., PH.D., A.M. (hon.), Gordon McKay Professor of Sanitary Chemistry

JOSEPH J. HARRINGTON, B.C.E., A.M., PH.D., Associate Professor of Environmental Health Engineering

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The following members of the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences participate in teaching in the School of Public Health:

WERNER STUMM, DR.PHIL., A.M. (hon.), Gordon McKay Professor of Applied Chemistry

MYRON B. FIERING, A.B., S.M., PH.D., Gordon McKay Professor of Engineering and Applied Mathematics

RALPH MITCHELL, B.A., PH.D., Associate Professor of Applied Biology

LLOYD A. SPIELMAN, B.S., M.S., PH.D., Assistant Professor of Environmental Engineering

ROBERT P. BURDEN, S.B., S.M., S.D., Administrative Associate in the Water Quality Program

The Courses in which members of this Department participate in the School of Public Health are listed under the Environmental Health courses on pages 97 and 99 (Environmental Health Interdepartmental 1a,1b and 11a,b).

The following courses of instruction offered in the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences are open to properly qualified students:

Engineering 250a. Design of Water Resource Systems

Half course (*fall term*). *M., W., F., at 8.* Professor THOMAS.

Principles of engineering and economic analysis applied to water resource systems. Functional design of comprehensive management systems for collection, storage, conveyance, treatment and distribution of water. Techniques of operations research and econometrics are used in developing methods for

planning integrated systems of dams, reservoirs, canals, pipe lines and networks, pumps, and treatment plants.

Prerequisites: Engineering Sciences 105a, 121, 123 or equivalents.

Engineering 250b. Design of Water Resource Systems

Half course (*spring term*). *M., W., F., at 8.* Professor THOMAS.

To be given in 1970–71.

Continuation of Engineering 250a with emphasis on non-linear systems and systems with stochastic components. Application to problems of water pollution and design of comprehensive programs for water quality management.

Prerequisite: Engineering 250a. Statistics 190 or equivalent is desirable.

Engineering 253. Advanced Topics in Environmental Engineering

Half course (*fall term*). *Tu., Th.,* (*S.*) *at 9* Professor FIERING.

To be given in 1970–71.

This course will emphasize those problems in the design and operation of environmental engineering systems which utilize digital and analog computations. Topics include hydrologic networks, simulation techniques for multi-structure systems and storage-yield relations for reservoirs. Students will be expected to prepare a term paper, to present the results in a class session, and to criticize the term papers prepared by others. A modest amount of machine time will be made available.

Prerequisites: Engineering Sciences 105a, a course in FORTRAN programming, and Engineering 250a, which may be taken concurrently.

Engineering 268. Transport Phenomena

Half course (*fall term*). *M., W., F., at 11.* Assistant Professor SPIELMAN.

Principles of mass, momentum and energy transport, emphasizing convective-diffusional mass transfer as applied to chemical process configurations: equations of forced and free convection in laminar and turbulent flows; simplified models for interphase transfer; chemically reacting systems; estimation of transport properties; electrolyte transport; coupled processes.

Prerequisite: An undergraduate course in fluid mechanics.

Engineering 270a. Engineering Systems for Environmental Control

Half course (*spring term*). *M., W., F., at 9.* Associate Professor HARRINGTON.

Provision of urban water; engineering aspects of the collection and disposal of spent water and solid wastes; significant interchanges between the gaseous, liquid and solid phases of the environment; geographic interchanges; time-

dependent developments. Data collection and processing for monitoring and control; maintenance and operation of pollution control systems.

Prerequisite: Engineering Sciences 123.

Engineering 270b. Water Process Technology

Half course (*spring term*). *M., W., F., at 12, and laboratory hours to be arranged.* Assistant Professor SPIELMAN.

Principles of design and scale-up of chemical and mass transfer operations applied to water treatment and pollution control: dimensional methods; use of bench- and pilot-scale rate and equilibrium data in the engineering of full scale reactors and selective transfer operations such as adsorption, ion exchange, gas absorption, liquid extraction, leaching and drying.

Engineering 271a. Principles of Aqueous Chemistry

Half course (*fall term*). *M., W., F., at 9, and laboratory, F., 2–5.* Professor STUMM.

Physical chemistry of aqueous media. Principles of analytical chemistry and their application to analysis of water. Sources and occurrence of important constituents in natural waters. Chemical principles applicable to operations of sanitary engineering.

Prerequisite: Chemistry 40a or 60 or equivalent chemical background.

Engineering 271b. Chemical and Biological Processes in Sanitary Engineering

Half course (*spring term*). *Hours to be arranged.* Professor MORRIS.

To be given in 1970–71.

Chemistry of softening, coagulation, disinfection, oxidation, corrosion control; ion exchange; biologically-mediated transformations in aerobic and anaerobic processes.

Prerequisites: Engineering 271a and 273a.

Engineering 272a. Water Quality and Its Control

Half course (*fall term*). *Tu., Th. 11–12:30.* Professor MORRIS.

Nature, sources and effects of inorganic and organic impurities in natural waters. Hygienic and esthetic aspects of water pollution. Natural purification of surface waters. Water quality standards. Chemistry of water and waste-water treatment.

Prerequisites: Engineering 271a and 273a, which may be taken concurrently, or equivalent.

Engineering 272b. Hydrogeochemical Cycles

Half course (*spring term*). *M., W., F., at 9.* Professor STUMM.

To be given in 1970–71.

Chemical characteristics of fresh and sea water. Comparison of natural water systems with equilibrium models. Origin of the chemical composition of natural waters. Elementary geochemistry of silicates, carbonates, hydroxides, phosphates and organic matter. Reciprocal interrelations between chemical environment and biota.

Prerequisite: Engineering 271a or equivalent chemical background.

Engineering 273a. Introduction to Environmental Microbiology

Half course (*spring term*). *M., W., F., at 11, and laboratory hours to be arranged.* Associate Professor MITCHELL.

Introduction to microbiology. Emphasis on microbial ecology. Water-borne pathogens. Application to problems in water pollution.

Engineering 273br. Special Topics in Environmental Microbiology

Half course (*fall term*). *Hours to be arranged.* Associate Professor MITCHELL.

Prerequisite: Engineering 273a or equivalent.

Engineering 274. Aquatic Biochemistry

Half course (*spring term*). *Tu., Th.,* (*S.*), *at 9.* Professor STUMM.

Biochemical regulations relevant to ecosystems. Microbially mediated chemical transformations. Cycle of carbon. Reciprocal interrelation of the chemical environment and the biota; chemostasis and homeostasis. Enzyme kinetics; induction, inhibition and repression of enzymes. Substrate utilization and excretion of organic compounds by organisms. Application of enzyme kinetics for analytical purposes.

Prerequisite: Background in physical chemistry.

Engineering 275. Mechanics and Separation of Particulates

Half course (*spring term*). *Hours to be arranged.* Assistant Professor SPIELMAN.

Low Reynolds number approach to suspended particulates in water and air; mechanics of bubbles and drops; precipitation and dissolution; mechanism of electrokinetic phenomena; mechanisms of particle capture in porous solids; nonideal settling; kinetics of coagulation and the theory of self-preserving particle size spectra; coalescence of oil-in-water dispersions induced by flow through porous solids.

Prerequisite: Engineering 268.

Engineering 276. Advanced Chemical Measurements

Half course (*spring term*). *Tu., Th., at 10, and two three-hour laboratory periods a week.* Professor Morris.

To be given in 1970–71.

Theoretical and experimental consideration of electrometric, photometric, and chromatographic techniques for chemical measurements. Applications to problems of environmental sanitation.

Prerequisite: Engineering 271a.

Engineering 277. Surface Chemistry

Half course (*fall term*). *Tu., Th., S. at 10.* Professor Morris.

To be given in 1970–71.

Characteristics of the colloidal state. Adsorption, electrokinetic phenomena. Structure and colloidal behavior of hydrous oxides and silicate minerals. Liquid surfaces and surface active materials.

Prerequisite: Engineering 271a.

Engineering 278. Reaction Rates and Mechanisms

Half course (*fall term*). *M., W., F., at 10.* Professor Morris.

To be omitted in 1970–71.

Chemical kinetics, with emphasis on reactions in aqueous systems, diffusion and enzyme-mediated processes. Interpretation of kinetic data. Inorganic reaction mechanisms.

Prerequisite: Engineering 271a, or equivalent.

Engineering 279. Applied Electrochemistry

Half course (*fall term*). *Hours to be arranged.* Professor Stumm.

To be given in 1970–71.

Dynamic interpretation of electrochemical processes. Kinetics of electrode processes. The electric double layer and electrokinetic phenomena. Metallic corrosion. Principles of cathodic and anodic technical processes. Electrochemistry as a source of energy; batteries and fuel cells.

Prerequisite: Chemistry 60 or similar background.

Department of Tropical Public Health

Thomas H. Weller, A.B., S.M., M.D., LL.D., Richard Pearson Strong Professor of Tropical Public Health, Director of the Center for the Prevention of Infectious Diseases, *and* Head of the Department

James H. S. Gear, B.SC., M.B., CH.B., D.P.H., D.T.M.&H., John LaPorte Given Visiting Professor of Tropical Public Health; *Director, South African Institute for Medical Research, Johannesburg*

Charlotte C. Campbell, S.B., Associate Professor of Medical Mycology

Eli Chernin, S.B., A.M., S.D., Associate Professor of Tropical Public Health

Dieter Koch-Weser, M.D., S.M., PH.D., Associate Professor of Tropical Public Health; *Associate Dean for International Programs, Harvard Medical School*

Edward H. Michelson, S.B., S.M., PH.D., Associate Professor of Tropical Public Health

Steve C. Pan, B.SC., M.D., M.P.H., Associate Professor of Tropical Public Health

Richard H. Daggy, S.B., S.M., PH.D., M.P.H., DR.P.H., Lecturer on Tropical Public Health *and* Associate Dean for International Programs

*Warren L. Berggren, S.B., M.D., M.P.H., DR.P.H., Assistant Professor of Applied Tropical Public Health; *Director of Community Health, Hôpital Albert Schweitzer, Haiti*

Peter Braun, S.B., M.D., Assistant Professor of Tropical Public Health

Andrew Spielman, S.B., S.D., Assistant Professor of Tropical Public Health

*G. Robert Coatney, A.B., A.M., PH.D., S.D. (hon.), Visiting Lecturer on Tropical Public Health

*Catherine Coolidge, A.B., M.D., M.P.H., Visiting Lecturer on Tropical Public Health

*Neville R. E. Fendall, B.SC., M.R.C.S., L.R.C.P., M.B.,B.S., M.D., D.P.H., Visiting Lecturer on Tropical Public Health; *Staff Member, The Population Council, Inc.*

*Harry Most, S.B., M.D., D.T.M. & H., D.M.S., Visiting Lecturer on Tropical Public Health; *Herman N. Biggs Professor and Chairman, Department of Preventive Medicine, New York University School of Medicine*

*Nevin S. Scrimshaw, A.B., A.M., PH.D., M.D., M.P.H., Visiting Lecturer on

* Part-time in the School of Public Health.

Tropical Public Health; *Professor of Nutrition and Head, Department of Nutrition and Food Science, Massachusetts Institute of Technology*

*David J. Sencer, M.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Chief, National Communicable Disease Control Center*

*Robert B. Watson, S.B., M.D., M.P.H., Visiting Lecturer on Tropical Health; *Lecturer in International Health, University of North Carolina School of Public Health*

*John M. Weir, S.B., M.D., PH.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Director, Medical and Natural Sciences, The Rockefeller Foundation*

Charlotte F. Litt, A.B., S.M., PH.D., Research Associate in Tropical Public Health

Charles M. Wheeler, S.B., S.M., PH.D., Research Associate in Entomology

Monte P. Bawden, A.B., PH.D., Research Fellow in Tropical Public Health

Martin K. Escher, M.D., M.P.H., Research Fellow in Tropical Public Health (to January 31, 1970)

Joseph O. Hendley, A.B., M.D., Research Fellow in Tropical Public Health

Joseph L. Waner, S.B., S.M., PH.D., Research Fellow in Tropical Public Health

Susan K. Wheeldon, B.SC., A.M., Assistant in Tropical Public Health

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Gustave J. Dammin, A.B., M.D., A.M. (hon.), *Elsie T. Friedman Professor of Pathology, Harvard Medical School*

Franz C. von Lichtenberg, M.D., DR. (hon.), *Associate Professor of Pathology at the Peter Bent Brigham Hospital*

The health problems of the tropical regions, as in poorly sanitated areas of the world elsewhere, are predominantly of an infectious and nutritional nature. The infectious diseases are the primary concern of the Department of Tropical Public Health, with particular emphasis given to protozoal, helminthic, and viral entities and to relevant arthropod and molluscan intermediate hosts. Within the framework of the Center for Prevention of Infectious Diseases, the Department of Tropical Public Health shares with the Department of Microbiology the responsibility for an integrated presentation of information on important infectious agents that produce disease in man. Emphasis is given to the ecology and epidemiology of the major infectious diseases and to their prevention and control.

The resolution of the health problems of tropical areas, as elsewhere, requires not only a specific knowledge of diseases but a multidisciplinary approach involving a considered appraisal of human resources as well as of relevant social, economic, and political factors. This elemental concept underlies the teaching program of the Department of Tropical Public Health, and

is exemplified in the course Tropical Public Health 3d, Problems in Tropical Health, open to all students. However, the student concentrating in the Department in preparation for a career in the field of international health should, in addition to Departmental courses, acquire a broadened experience by elective work in other areas under the aegis of the Division of International Health.

The basic course, Microbiology and Tropical Public Health 1a,b, is designed to provide students in the Master of Public Health program with newly-elaborated knowledge regarding major infectious diseases, and with the factual information concerning the epidemiology and control of selected entities of public health importance. Students concentrating in the Department will normally be expected to elect Microbiology and Tropical Public Health 2b, Tropical Public Health 3d, and Tropical Public Health 4c. Other advanced courses in Tropical Public Health are considered electives, to be selected on the basis of individual student interest and need.

The investigative program in the Department is broad and currently deals with pathogens ranging from viruses to helminths. Thus, studies on the *in vitro* cultivation and the physiology and immunology of a wide variety of agents are in progress. Biological investigations on the molluscan vectors of the schistosomes comprise another area of major interest. Facilities are available for the training of a limited number of students at the Doctor of Public Health or Doctor of Science in Hygiene level, who may wish to spend a minimum of two years with emphasis on a program of original research. Due to time limitations, the Doctor of Science in Hygiene applicant should, in so far as possible, obtain the necessary medical science background prior to enrollment.

A program supported by the National Institutes of Health is available to assist qualified applicants who desire training in medical parasitology and a similar program is available to provide training in tropical medicine. Collaborative arrangements established with institutions in the tropics provide diversified opportunities for study and research overseas.

Microbiology and Tropical Public Health 1a,b. Ecology and Epidemiology of Infectious Diseases

Lectures, seminars, and laboratory exercises. *Three one-hour sessions and one three-hour session each week, first period; one one-hour session and two two-hour sessions each week, second period.* Dr. Weller, Associate Professor Campbell, and Staffs of the two Departments.

Credit 4 units.

Recommended as part of basic core curriculum for Master of Public Health candidates.

This course is designed to provide an integrated presentation of information

on communicable diseases of major public health importance. The exercises include discussions of the present status of infectious diseases in temperate and tropical climates, of procedures for their control at the community level, and of techniques available for study of microorganisms and parasites with special reference to recently developed methods which have opened a new era in microbiology. Coverage of etiologic agents includes the protozoa, helminths, viruses, rickettsiae, spirochetes, fungi, and bacteria. To achieve a comprehensive approach, subjects of public health importance and of diverse etiologies, such as the acute respiratory diseases, are considered in an integrated manner. Other important entities, such as malaria and schistosomiasis, are selected for emphasis as case examples to illustrate epidemiological concepts and the elements of control.

The course assumes a medical school background and an understanding of the pathogenesis of disease produced by infectious agents in the affected individual. It is concerned primarily with the ecologic factors affecting transmission of infectious agents in the human community, with assessment of public health significance of representative infectious diseases, and with approaches to their prevention and control. In the laboratory, the student is not expected to acquire technological skills, but rather an understanding of the potentialities as well as of the limitations of pertinent public health laboratory procedures.

Microbiology and Tropical Public Health 2b. Current Research in Infectious Diseases

Seminars. *One two-hour session each week, second period.* Dr. CHERNIN, Dr. VINSON and Staffs of the Departments of Microbiology and Tropical Public Health.

Credit 1 unit.

This course is required of all those concentrating in Microbiology or Tropical Public Health. Papers on topics of general interest are selected from current periodicals and critically reviewed as to soundness of experimental design, validity and significance of results and conclusions, organization of manuscripts and clarity of presentation.

Enrollment of nondepartmental students subject to approval of Instructor.

Tropical Public Health 3d. Problems in Tropical Health

Lectures and conferences. *One two-hour session each week, fourth period.* Dr. WELLER and Guest Lecturers.

Credit 1 unit.

This course is designed to provide general background information on environmental, social, economic, and political factors influencing the development of health programs in the tropics. At each session a distinguished guest

lecturer covers an assigned topic; the subject material includes such diversified topics as the development of professional education in tropical areas, the important problems of agriculture, nutrition, and water supply, and the administrative and political backgrounds in the field of international technical cooperation. Each formal presentation is followed by a period devoted to informal student discussion. Enrollment is open to all students.

Tropical Public Health 4c. Public Health Aspects of Parasitic Diseases

Lectures, seminars, and laboratory exercises. *Two three-hour sessions each week, third period.* Dr. PAN, Dr. BRAUN and Staff of the Department.

Credit 2.5 units.

This course amplifies material presented in the basic course, and additionally provides coverage of significant parasitic entities not dealt with in Microbiology-Tropical Public Health 1a,b. Concepts relevant to the investigation and control of parasitic diseases, such as quantitation of infection, are stressed. Selected examples of control programs will be examined. In the laboratory, the student will become familiar with techniques essential for the epidemiologic investigation of the important parasitic diseases of man.

Enrollment is limited and is subject to the approval of the Instructor.

Tropical Public Health 5c. Clinical and Pathologic Features of Tropical Diseases

Case presentations, clinico-pathologic conferences, and demonstrations. *One two-hour session each week, third period.* Dr. WELLER, Dr. GEAR, Dr. LICHTENBERG and Staff of the Department.

Credit 1 unit.

This course, designed for students particularly interested in tropical medicine, supplements material presented in Microbiology-Tropical Public Health 1a,b. The emphasis is on the clinico-pathologic aspects of tropical diseases. At each session one or more disease entities are introduced by presentation of a clinical case and pertinent clinical and pathologic features of the disease are then reviewed.

Enrollment is subject to the approval of the Instructor.

Microbiology and Tropical Public Health 6d. Tuberculosis

Seminars. *One two-hour session each week, fourth period.* Dr. KOCH-WESER and Associate Professor CAMPBELL.

Credit 1 unit.

The purpose of this course is to provide an understanding of the ecology and the public health significance of tuberculosis which continues to be a

worldwide problem of major importance. Various features of tuberculosis are discussed; particularly the microbiologic, medical, social, and economic aspects.

The significance of differentiating diseases often confused with tuberculosis, especially the respiratory mycoses and "atypical" mycobacterioses, is also considered. These discussions are based on selected reports in the literature and experiences of students and Faculty members in developed and developing nations with tuberculosis programs and control.

Visits to local tuberculosis hospital laboratories are arranged upon request.

Tropical Public Health 7d. Introduction to Molluscs of Public Health Importance

Conferences, laboratory and field exercises. *One three-hour session each week, fourth period.* Dr. MICHELSON.

Credit 1 unit.

To be given in 1970–71, alternates yearly with Tropical Public Health 8d.

This is an introductory course designed to acquaint the student with the molluscs which may act either as active or passive agents for the dispersal of pathogens, toxins, or parasites which cause disease in man. Special emphasis is given to snails which serve as intermediate hosts of mammalian schistosomes. Students are offered the opportunity to study field and laboratory techniques necessary for an understanding of the taxonomy, morphology, cultivation, ecology and control of these medically important molluscs.

Enrollment is subject to the approval of the Instructor.

Tropical Public Health 8d. Epidemiology and Control of Schistosomiasis

Seminars and laboratory exercises. *One three-hour session each week, fourth period.* Dr. MICHELSON, Dr. CHERNIN, Dr. PAN, Dr. WELLER.

Credit 1 unit.

To be given in 1969–70; alternates yearly with Tropical Public Health 7d.

The problems posed by schistosomiasis as an expanding health hazard are presented in a series of seminars and laboratory exercises. Emphasis is given to the biology of snail vectors, to problems of assessment of significance of the disease, and to the potentials of various approaches to control. Opportunity to become familiar with appropriate techniques is afforded in the laboratory.

Enrollment is subject to the approval of the Instructor.

Tropical Public Health 9d. Introduction to Medical Entomology

Conferences, laboratory, and field exercises. *One three-hour session each week, fourth period.* Dr. SPIELMAN.

Credit 1 unit.

To be given in 1969–70; alternates yearly with Tropical Public Health 10d.

This course deals with the insects, ticks, and mites of public health importance. The manner in which arthropods transmit disease and the principles of vector control are discussed from ecological, physiological and genetic points of view. Each conference presents an aspect of arthropod biology as it pertains to public health. Laboratory colonies of various vector species are maintained by the students to provide the basic material for study of life cycles and for arthropod identification. Laboratory and field exercises demonstrate entomological techniques currently employed by epidemiologists.

Enrollment is subject to the approval of the Instructor.

Tropical Public Health 10d. Current Problems in Malariology

Seminars and laboratory exercises. *One three-hour session each week, fourth period.* Dr. CHERNIN, Dr. SPIELMAN, Dr. WELLER, and Staff of the Department.

Credit 1 unit.

To be given in 1970–71; alternates yearly with Tropical Public Health 9d.

This course supplements the subject material on malaria offered in Microbiology-Tropical Public Health 1 a, b and Tropical Public Health 4c. Particular attention is given to problems now encountered in eradication and control programs. In the laboratory, experience is provided with procedures essential to the epidemiologic investigation of malaria.

Enrollment is subject to the approval of the Instructor.

Microbiology and Tropical Public Health 11d. Medical Mycology

Laboratory, conferences and field exercises. *One three-hour session and three hours of individual laboratory work each week, fourth period.* Associate Professor CAMPBELL.

Credit 2 units.

This course concerns principles and techniques essential to the study of pathogenic fungi of medical and public health importance. It consists of conferences, lectures and laboratory and field work under tutorial supervision. Emphasis is placed on the isolation of mycotic agents from cases in humans and sources in nature by *in vitro* and *in vivo* cultivation, and on identification by morphologic, biochemical and histologic characteristics. Procedures for soil baiting, soil sampling, skin and serologic tests, as adjuncts in establishing indirect or presumptive diagnosis and in defining geographic distribution and areas of high endemicity, are integral aspects of the course.

The course is designed to prepare graduates for laboratory research or field studies in medical mycology.

Enrollment is subject to the approval of the Instructor.

Microbiology and Tropical Public Health 14c,d. Case Studies in Epidemiology of Infectious Disease

Conferences, seminars, laboratory exercises. *One two-hour session each week, third and fourth periods.* Dr. BELL.

Credit 2 units.

This course is constructed to provide experience in solving epidemiologic problems in communicable disease. Actual epidemics of such disease as tuberculosis, hepatitis, arbovirus, and smallpox are solved on paper in classroom laboratory-type sessions with emphasis on a commitment by the participants at each stage of the solution.

Tropical Public Health 17a,b,c,d,e. Introduction to Laboratory Research

Laboratory exercises. *Time and credit to be arranged.*

Individual work for candidates at the Master's degree level may be carried out under supervision of a member of the Department. A variety of parasites of medical importance are maintained and are available for studies on metabolism, host-parasite relationships, and chemotherapy. Arrangements are subject to the approval of the Instructor.

Tropical Public Health 20. Research

Doctoral candidates or qualified full-time special students may undertake original investigations in the laboratory or in the field by arrangement with the Head of the Department.

Members of the Department are currently engaged in the following areas of research:

20.1 Tissue culture and immunological techniques as applied to problems in medical virology (Dr. Weller and Dr. Braun).

20.2 Cultivation *in vitro* of parasitic helminths, protozoa, and other invertebrates of medical importance (Dr. Weller, Dr. Chernin, and Dr. Pan).

20.3 Biology, host-parasite relationships, and control of molluscan vectors of schistosomiasis and of other parasitic infections (Dr. Chernin, Dr. Michelson, and Dr. Pan).

20.4 Population genetics, nutrition, and reproduction of medically important arthropods (Dr. Spielman).

20.5 Arthropod transmission of viral, protozoan, and helminthic agents (Dr. Spielman).

FIVE

SPECIAL PROGRAMS

Programs in International Health

The School of Public Health has developed a Division of International Health. The primary objective of this Division is to utilize all departments and facilities of the School, as well as other related divisions of the University, to provide a comprehensive, effective, and efficient program of teaching, research, and service in all fields of international health.

The programs centered in the School, together with related course offerings in other divisions of Harvard University and the Massachusetts Institute of Technology, offer the student a broad background in preparation for future careers in the World Health Organization, the Agency for International Development of the U.S. State Department, the U.S. Public Health Service, the Peace Corps, the Armed Forces, industrial organizations, mission groups, philanthropic foundations, or with other governments and agencies providing varied careers in international health and in planning health services for developing countries.

The relevant course offerings are not concentrated in any one department of the School, since all departments have broad international interests in their respective fields. In addition to the requirements for the Master of Public Health degree, a varied selection of elective courses is available in the various Departments of the School in preparation for careers in international health.

Other divisions of Harvard University, namely the:

Medical School
Faculty of Arts and Sciences
Graduate School of Government
Center for Middle Eastern Studies
East Asian Research Center and
Development Advisory Service of the
Center for International Affairs

provide additional opportunities for study in medicine, economics, public administration, anthropology, government, social relations, language, and related subjects for students with special interests in particular regions of the world. Cross-registration opportunities for students interested in similar course offerings given by the Massachusetts Institute of Technology are also available. The various catalogues of these Faculties may be consulted for further details.

Programs of study may be selected leading to the Master of Public Health or Master of Science in Hygiene degree. Advanced students may be accepted as candidates for the Doctor of Public Health or Doctor of Science in Hygiene degree. A three-year residency program for physicians preparing for certification by the American Board of Preventive Medicine in the area of General Preventive Medicine (International Health) is also available to selected students.

Areas in which supervised field work or research may be undertaken will vary, depending on current opportunities afforded and the availability of qualified supervision. For example, under the sponsorship of the Department of Tropical Public Health, trainees have been engaged in studies on schistosomiasis in Nigeria and Brazil, on malaria in Gambia, and on nutritional anemias in Uganda. The Department of Nutrition has sponsored trainees in nutritional studies in Colombia. Other relationships have been or are in the process of being established with the Hôpital Albert Schweitzer in Haiti, Ministry of Health in the Bahamas, Puerto Rico, Jamaica, Brazil, Tunisia, Italy, Israel, Lebanon, Saudi Arabia, Nigeria, and in other developing areas of the world. Assignments to international agencies for work experience or research activities abroad are made only when the School is assured that competent local supervision and guidance are available.

Examples of current international research being conducted by the School include trachoma research in Saudi Arabia and Lebanon; interrelationships of health and economic development in Tunisia; child growth and development in Italy; comparative heart disease studies in Ireland and U.S.; nutrition research in Colombia and Israel; population studies in Chile, Greece, United Arab Re-

public and India; research on Chagas' disease in Brazil; typhus in Yugoslavia; research on urinary calculi in Thailand; cooperative cardiovascular disease investigation in Japan; relative importance of hereditary environmental factors in cardiovascular disease in Israel; collaborative studies on cervical cancer, breast cancer and leukemia involving numerous countries; and comparisons of prevalence of chronic respiratory disease between the United States and the United Kingdom, and the United States and Japan.

Dr. Richard H. Daggy

The School has sponsored triennial meetings of the *Industrial Caouncil for Tropical Health* since 1950, the next being scheduled in the fall of 1969. These conferences bring together guest experts,

members of the Faculty, and medical and managerial personnel of corporations having interests in tropical regions for scientific and practical discussions of health problems. Through these conferences the School has established a wealth of international contacts which are of mutual benefit to industry, the School, its students, and alumni throughout the world.

International House, the School's residence for its graduate students and their families, both from the United States and abroad, provides an unusual opportunity for international contacts and extracurricular activities with professional health workers from a variety of countries. Some twenty-two to twenty-eight nations are represented in this group each year. Throughout the year there are opportunities for informal interchanges of ideas between students and their families. In addition, there are frequent discussions on topics of international interest, including presentations by international students on the culture, geography, social structure, and health problems of their home countries.

Finally, the Boston area as a whole provides a stimulating atmosphere for students interested in international affairs through such agencies as the local chapter of the Society for International Development, World Affairs Council, Pan American Society of New England, and many other agencies, programs and activities.

An International House tea

More current details on residency opportunities or other aspects of these programs may be obtained by addressing inquiries to Dr. Richard H. Daggy, Associate Dean for International Programs at the School.

Program in Occupational Medicine

The School offers to qualified applicants the two years of academic training requisite to certification in Occupational Medicine. Physicians may enroll in this program through any of the master's degree programs offered by the School. Physicians planning an academic or research career may be accepted for work toward a doctoral degree in occupational medicine or environmental health. Other students may elect a second year of formal courses and tutorial study in occupational medicine and public health. The usual course content of the first-year program is listed under the Master of Industrial Health degree. Additional courses and course content may be found under the departmental listings. In addition, as in other programs of the School, it is possible to cross-register with other Harvard faculties and with Massachusetts Institute of Technology to pursue special interests.

Clinical experience is offered in certain of the Harvard-affiliated hospitals where both occupational and non-occupational disease can be seen. Further experience is obtained through the University Health Services at Harvard (approved for third year, in-plant residency) and the Occupational Medical Services at The Massachusetts Institute of Technology. Experience in an industrial medical department can be arranged during the summer months in selected local industries to supplement the academic training.

Financial support is available from Federal grants to the School. United States citizenship or permanent residency status is required for these fellowships. For more detailed information on various aspects of the Program address inquiries to Dr. James L. Whittenberger, Professor and Head, Department of Physiology, Harvard School of Public Health.

Interfaculty Program on Health and Medical Care

The Interfaculty Program on Health and Medical Care is a cooperative undertaking of the Schools of Public Health, Medicine, Government, Business Administration, and the Department of Economics in the Faculty of Arts and Sciences. Its major purpose is to provide advanced programs in the economics and administration of medical care at both the master's degree and doctoral levels for personnel in the various relevant disciplines.

The Program is intended to equip the student for administrative and policy-making posts in medical care programs or for related teaching and research positions. The Program is planned for several types of students: (1) for those whose needs are met by a a master's degree program at the School of Public Health or School of Government, (2) for students who wish to specialize more intensively in medical care during a two year-period, (3) for doctoral candidates under the guidance of any of the participating faculties, and (4) for physicians participating in the residency program in General Preventive Medicine (Health Services Administration) in the School of Public Health.

The Program offers training and research experience in the provision of medical care services and stresses the study and analysis of varying patterns of organization, delivery, and financing of personal health services in the United States and other countries. Students include physicians and other health professionals, economists, social scientists, and management analysts. They are from the various participating schools and departments within Harvard University, and are enrolled as master or doctoral degree candidates in their own schools and departments while taking the Program's basic courses.

A wide range of elective courses is available, in addition to those

offered by the School of Public Health, through the various faculties concerned and from the Massachusetts Institute of Technology.

The objective with students enrolled in the School of Public Health is to instruct them in analysis and decision-making and to give them an appreciation of the application of the administrative and social sciences in the operation of medical care programs. For students from other than the School of Public Health, the Program's objective is to provide an adequate understanding of medical care and the special attributes of organized forms of medical care services and to encourage the intelligent application of their own specialties to analysis, planning, evaluation, and research in the field of personal health services.

The Program's research studies provide opportunities for exceptional students to undertake doctoral work and to gain substantial research experience.

For more detailed information on various aspects of the Program, including support for physician residency training, address inquiries to Dr. Alonzo S. Yerby, Professor of Health Services Administration and Director of the Interfaculty Program on Health and Medical Care.

Postdoctoral Fellowship Program in Dental Public Health

The School of Dental Medicine in cooperation with the School of Public Health and the Massachusetts Department of Public Health offers a three-year program of postdoctoral study intended to prepare a limited number of individuals for creative full-time careers in dental public health and ecological dentistry. Each person accepted into the program will be appointed as a Research Fellow in Ecological Dentistry at the School of Dental Medicine.

The first year of the program is spent at the School of Public Health as a candidate for the degree of Master of Public Health. Graduates of other such schools, however, may be accepted into the program with one year advanced standing. The second year involves residency training in cooperation with the Massachusetts Department of Public Health to meet the requirements of the American Board of Dental Public Health. The third year affords opportunity for advanced didactic work and research at the School of Dental Medicine, the School of Public Health and/or other institutions. A research thesis is prepared in this year. A three-year postdoctoral fellowship certificate is awarded upon completion.

The program is designed to meet the needs of the particular student. Academic study beyond the master's level may be arranged in other departments of the University. Residency training involves responsible work with the Massachusetts Department of Public Health at the state or community level. Epidemiological or other research work can be carried on over the entire three-year period in a variety of situations involving either new or continuing studies.

For further information and application forms, write to James M. Dunning, D.D.S., M.P.H., Professor of Ecological Dentistry, Harvard School of Dental Medicine, 188 Longwood Avenue, Boston, Massachusetts, 02115.

Special Courses in Preparation for Careers in Teaching

The role of community-oriented instruction in medical education has, in recent years, been receiving increasing recognition. Major changes are taking place in the teaching of public health and preventive medicine, both in the United States and abroad. The challenge of expanding teaching responsibilities has led to a growing need for qualified teachers of public health, preventive medicine, and preventive dentistry in schools of public health, medicine and dentistry as well as in community-based health programs.

The interest of the Harvard School of Public Health in preparing students for teaching posts both within the United States and abroad is underscored by the fact that approximately 60% of the students plan to teach on a full-time basis following graduation from the School. In many instances such alumni prepared for their teaching and research careers by completing the program for the degree of Doctor of Public Health or Doctor of Science in Hygiene in their chosen academic specialties. Although the curriculum has emphasized didactic instruction in a particular academic discipline as well as training in research methodology, there has, however, been a need for special courses in teaching methods to supplement the various programs of the twelve departments of the School.

The special courses in teaching methods which were developed during 1956–61 have been continued and further modified. Their major goals are:

1. To develop competence in the formulation of education policy in the field of preventive medicine and public health.
2. To introduce students to modern educational methods and media and enable them to utilize specific methods to implement their own instructional objectives.

3. To help students to develop patterns of self-education through which they may continue to increase their competence in teaching after completion of the program.

These courses may be taken as part of a program leading to either a Master of Public Health or Master of Science in Hygiene degree.

The objectives of the special courses are carried out by supplementing the existing departmental course structure by means of special seminars and tutorial instruction offered by senior members of the Faculty. Participants include Faculty from Harvard Graduate School of Education and from other Harvard Schools as well as specialists in medical education from departments of preventive medicine throughout the country. These guest participants augment the regular Faculty of the Harvard School of Public Health in seminar presentations which are developed in three sections. One section is concerned with the orientation of teaching in the field of public health and preventive medicine. The various approaches to teaching in this area are considered in historical and geographical perspective and in relation to the changing goals of education in the health sciences. A parallel section of the course provides an overview of current educational theory and methodology in terms of the relevance to public health teaching. This includes principles of curriculum development, formulation of educational objectives, selection of teaching methods, and forms of evaluation. A final section of the course gives students an opportunity to study selected educational methods in depth.

Further information on the special courses may be obtained by addressing inquiries to Dr. Ascher J. Segall, Associate Professor of Epidemiology.

SIX

GENERAL INFORMATION

Registration

Registration in the School of Public Health for the academic year 1969–70 will be held on the following dates:

September 8, Monday, 10 A.M.	Opening session and registration for new International Students
September 10, Wednesday, 2 P.M.	Opening session and registration for new U.S. Students
September 15, Monday, 10 A.M.	Opening session and registration for students enrolled in 1968–69

The period between the opening sessions and September 17 will be devoted to orientation lectures, individual conferences with Faculty members, and selection of courses of study. All students are required to attend the opening session and to be present for the registration period.

International Students

A program of lectures and discussions during the period from Monday, September 8 through Tuesday, September 16, 1969, is planned to acquaint the students with our customs and teaching methods, with library and other facilities available. It includes visits to various University departments and to hospitals or public health activities in Boston.

During this period each student who comes from outside the United States will have a conference with the Associate Dean for International Programs to discuss his particular needs and interests. The Associate Dean, as well as the staff of the Dean's Office, is available for consultation with students throughout the year.

All students who are not citizens of the United States are referred during the orientation period to the Harvard International Office, Holyoke Center, 75 Mt. Auburn Street, Cambridge, where they show their passports and fill out a Student Registration form.

Fees and Expenses

The tuition fees for the academic year 1969–70 are listed below. The fee includes the Health Service Fee for medical care and hospital insurance for all resident students. Each candidate for a degree must have a minimum of one year of residence at the School at full tuition.

	Rate
Full-time resident students	$2,400
Half-time resident students	1,350

All students will pay tuition at the above rates with the following exceptions:

Doctoral candidates or Special Students in the second or later years of a doctoral or special program:

Full-time resident students	$1,350
Half-time resident students	700
Non-resident doctoral candidates, registered in absentia	200
Part-time Special Students, enrolled for less than half-time:	
First credit unit of work	110
Each additional unit per term up to 10 units	52.50

Summer Session — Effective July 1, 1970

Students who register and receive credit for research or supervised study during the 12-week summer period	$ 400

Students registered for less than 12 weeks will pay at a proportionate rate.

Payment of Fees

Bills for tuition and fees will be issued and payable as follows:

Issued	*Payable*	
At registration	Within 10 days	¼ Tuition
Nov. 30	Dec. 15	¼ Tuition Miscellaneous Charges
Jan. 30	Feb. 15	¼ Tuition Miscellaneous Charges
April 30	May 15	¼ Tuition Miscellaneous Charges
June 3*	June 10	Miscellaneous Charges
June 30	July 15	Miscellaneous Charges

Students who are candidates for degrees must have paid all dues to the University at least one day before the day upon which the

* Applies only to candidates for degrees.

degrees are to be voted. A student who leaves during the year is charged to the end of the tuition period in which he leaves, provided before that time he gives the Dean notice in writing of his withdrawal; otherwise he is charged to the end of the tuition period in which such notice is given.

A student who leaves the University for any reason whatever must pay all charges against him immediately upon receipt of a bill from the Comptroller's Office. Every student is held responsible for the payment of fees until he has notified the Dean of his intention to withdraw from the School.

All term bills are sent to the student at his local address unless the Comptroller's Office is requested in writing to send them elsewhere.

Any student whose indebtedness to the University remains unpaid on the date fixed for payment is deprived of the privileges of the University. Reinstatement is obtained only by consent of the Dean of the School in which the student is enrolled after payment of all indebtedness and a reinstatement fee of $10. In addition as a condition of reinstatement such student is required to file with the Comptroller a bond in the amount of $1000 as security for the payment of future term bills.

Field Observation Study Visit

The estimated cost of travel, hotel accommodations, and food for the one-week study period in Puerto Rico (Maternal and Child Health 30e) is $275. Each student wishing to enroll in the course should assure himself that the necessary funds to cover this expense are available from his fellowship or other sources.

Student Health Service

Under the University Health and Insurance Plan, students at the School of Public Health receive medical care and insurance toward hospital expenses. Medical care is provided through the facilities of the Medical Area Health Service, located in Vanderbilt Hall. The hospitalization insurance extends for a period of twelve months from September 1, and covers hospitalization in Boston and elsewhere. Research and Teaching Fellows who are in a training status are required to enroll in the Student Health Plan unless they can show that they have comparable coverage.

A prepaid program for the care of wives and children of full-time students is available. As the plan provides extensive benefits for ambulatory and inpatient care, all who are eligible are strongly advised to enroll. Its coverage, like that of the Student Plan, extends for a period of twelve months from September 1, and provides full semi-private hospitalization benefits. Information about the plan for dependents is sent to students in advance of registration or may be obtained from the Registrar.

Entrance medical examinations are required of all entering full-time students except for United States Government employees and United States military personnel.

Evidence of successful vaccination against smallpox within three year is required for entrance to Harvard University, and a certification form for this purpose is sent to each student who is accepted for admission.

Any illness necessitating absence from classes should be reported to the Student Health Service Office by the student or an attending physician, and to the Registrar's Office at the School. A physician from the Health Service is on call twenty-four hours a day and can be reached through the switchboard of Harvard University.

Residents enjoy a wide selection for browsing, reading and borrowing in the International House library.

The children have their own playroom indoors and a park-playground outside.

Housing

The Henry Lee Shattuck International House is an apartment residence operated on a nonprofit basis by the Harvard School of Public Health for its full-time students and their families. The sixty-one furnished apartments are leased on a ten-month basis for the period September 1 through June 30 rather than the customary twelve months. Special arrangements can be made for summer rentals in July and August.

The necessary application forms and additional information regarding the House are distributed by the Registrar's Office with the catalogue of the School. Students wishing to be considered for ac-

The children entertain at a Christmas party.

commodations are advised to submit applications by May 1. However, late applications will be accepted as long as space is available. Applications for the Shattuck International House should be sent to:

Mrs. Margaret D. Penrose
Harvard School of Public Health
55 Shattuck Street
Boston, Massachusetts 02115

In general, housing in Boston is expensive and adequately furnished apartments are limited. Additional information on housing in the vicinity of the School, other than the Shattuck International House, and in nearby residential areas may be obtained from the Harvard University Housing Office, 1737 Cambridge Street, Cambridge, Mass. 02138. Students writing for information should indicate the size of their family, the number of rooms desired and whether or not they wish furnished or unfurnished accommodations.

Fellowships, Traineeships and Scholarships

Most students in training for a career in public health are able to obtain financial assistance, in some cases adequate to meet the costs of living in Boston. The applicant should be aware, however, of the many restrictions on the availability of such funds. Most of the funds for financial aid are available through grants from the federal government, and eligibility for these requires U.S. citizenship or equivalent status. Almost without exception, students must be enrolled on a full-time basis and be candidates for degrees. A very small amount of money is available on a scholarship basis from University funds; *this is sufficient for only one or two awards per year.*

Detailed information can be obtained by writing to the Director of Admissions, Harvard School of Public Health, 55 Shattuck Street, Boston, Massachusetts 02115.

Dr. Margaret E. Drolette, Assistant Professor of Biostatistics, was recipient of the "Golden Apple" award presented by the Class of 1969 on June 12, for her outstanding devotion and ability as a teacher.

Students 1968-69

Degree Candidates and Full-Time Special Students

Phyllis F. Agran, A.B., A.M.	Los Angeles, California
Abdul-Razzak, M. Al-Adwani, M.B.,B.S.	Kuwait, Arabia
Ezzat K. Amine, B.SC.	Alexandria, Egypt
Lynne M. Ausman, S.B.	Monterey, California
Henry D. Banta, M.D., M.P.H.	Boston, Massachusetts
Louise N. Bell, A.B., M.P.A.	Pittsburgh, Pennsylvania
Terry M. Bennett, M.D.	Pasadena, California
Robert B. Berg, A.B., M.D.	Newton, Massachusetts
Vicente Borrero-Restrepo, M.D., M.P.H., S.M. in Hyg.	Cali, Colombia
Andrew G. Braun, A.B., S.B., S.M. IN HYG.	Brookline, Massachusetts
David R. Brown, S.B., S.M.	Cloverdale, California
Richard C. Brown, A.B., M.D., M.P.H.	Norfolk, Virginia
Rudolf Bruppacher, M.D.	Zurich, Switzerland
Young S. Chang, B.S., S.M.	Seoul, Korea
Helen P. Cleary, A.B., M.P.H.	Norfolk, Massachusetts
Steven D. Cohen, S.B., S.M.	Framingham, Massachusetts
Philip T. Cole, A.B., M.D., M.P.H.	Brighton, Massachusetts
Rober R. Connelly, S.B., S.M. IN HYG. (in absentia)	Mason City, Iowa
Raymond D. Cotton, A.B., LL.B.	Cambridge, Massachusetts
James M. Crawford, D.D.S.	Chico, California
Jack E. Dauch, S.B.	Norwalk, Ohio
Michael A. Davis, S.B., S.M., S.M. IN HYG. (in absentia)	Stoughton, Massachusetts
Mary H. Dawson, A.B.	Brookline, Massachusetts
Stanley V. Dawson, S.B., S.M.	Cambridge, Massachusetts
Paul F. DePaola, A.B., D.D.S., M.D.S.	Boston, Massachusetts
Roger C. DeWilde, M.D.	Antwerp, Belgium
Louis E. Dickinson, A.B., M.D., M.P.H.	McCook, Nebraska
Louise A. Dierker, A.B., M.D.	Columbus, Ohio
John D. Dougherty, A.B., M.D., M.P.H. (in absentia)	Boston, Massachusetts
Marjorie A. Drucker, S.B.	River Edge, New Jersey
Johanna T. Dwyer, S.B., S.M., S.M. IN HYG.	Syracuse, New York
William M. Dyer, Jr., S.B., M.D.	Johnson City, Tennessee
Bruce A. Egan, A.B., S.M.	Brookline, Massachusetts

Martin K. Escher, M.D.	Wallisellen, Switzerland
Jacqueline J. Fabia, M.D., S.M. IN HYG. (in absentia)	Paris, France
Joseph B. Fashakin, S.B., S.M., S.M.	Akure, W. Nigeria
Howard M. Field, A.B., D.D.S.	Madison, Wisconsin
Alan N. Fleckner, S.B. PHARM., M.D.	Westwood, Massachusetts
Peter A. Fleming, A.B., M.D.	San Diego, California
Charles J. Gibson, A.B., M.D.	Lincoln, Nebraska
Judith D. Goldberg, A.B., S.M. IN HYG.	New York, New York
Michael D. Goldman, A.B., M.D., S.M. IN HYG.	Wayland, Massachusetts
Donald E. Goldstone, A.B., M.D., M.P.H.	Baltimore, Maryland
Arnold Golodetz, A.B., M.D.	Lexington, Massachusetts
David Goodman, A.B., S.B., M.D.	Quincy, Massachusetts
Leonard S. Gottlieb, A.B., M.D.	Brookline, Massachusetts
Peter Greenwald, A.B., M.D., M.P.H. (in absentia)	Albany, New York
Barbara N. Grossman, A.B., M.A.T., S.M. IN HYG.	Cambridge, Massachusetts
Jean-Pierre Habicht, M.D., M.P.H.	Geneva, Switzerland
Douglas I. Hammer, S.B., M.D., M.P.H.	South Orange, New Jersey
Hedda L. Haning, A.B., M.D.	Cleveland, Ohio
Andrew C. Harper, M.B.,B.S.	New South Wales, Australia
Stuart C. Hartz, B.B.A., S.M.	West Roxbury, Massachusetts
Charles W. Hays, A.B., M.D.	Springfield, Missouri
Charles D. Hearey, Jr., A.B.	Oaklyn, New Jersey
Marion E. Highriter, A.B., M.N., M.P.H. (in absentia)	Chapel Hill, North Carolina
William C. Hinds, B.M.E.	Waterville, Maine
Alan R. Hinman, A.B., M.D.	Atlanta, Georgia
Margaret B. Hoff, A.B., S.M.	Niagara Falls, New York
Samer S. Islam, M.B.,B.CH., D.C.H., D.M. M.P.H.	Jeddah, Saudi Arabia
Edward B. Jaffe, A.B.	Worcester, Massachusetts
Louis F. Johnson, Jr., S.B., M.D., M.P.H. (in absentia)	Los Angeles, California
Charles T. Kaelber, A.B., S.B., M.D., M.P.H.	Marion, Ohio
Tore Kalager, M.D.	Oslo, Norway
Hatim A. Kanaaneh, A.B., B.S., M.D.	Arrabeh Village, Israel
Paula H. Kanarek, S.B.	Oak Park, Michigan
Michael L. Kaplan, A.B., D.V.M.	Marblehead, Massachusetts
Samuel D. Kaplan, A.B., M.D.	Port Jervis, New York
Aliza R. Kasachkoff, A.B.	Washington, D.C.
Joel Kavet, S.B., M.P.H.	Branford, Connecticut

A. Kay Keiser, S.B., M.P.H.	Newtonville, Massachusetts
Ralph L. Kent, Jr., A.B., S.M. IN HYG.	Milton, Massachusetts
Irving I. Kessler, A.B., A.M., M.D., M.P.H. (in absentia)	Baltimore, Maryland
Rosemary C. Lee, S.B.	Springfield, Pennsylvania
Joan M. Leeming, M.B.,CH.B.	Manchester, England
Janice C. Levy, A.B., M.D.	Newton Center, Massachusetts
Jennifer L. Link, A.B.	Somerville, Massachusetts
Craig H. Llewellyn, A.B., M.D., M.P.H.	Berwick, Pennsylvania
Robert D. Lynch, A.B., S.M. IN HYG.	Medford, Massachusetts
Joseph L. Lyon, S.B., M.D.	Salt Lake City, Utah
James A. MacDonald, S.B.	Hudson, New Hampshire
Thomas M. Mack, A.B., M.D.	Minden, Nevada
Anastasia Makris, A.B., S.M.	Bristol, Connecticut
Therese Martin Malcolm, A.M., A.B.	Natick, Massachusetts
Paula S. Mansur, S.B., M.D.	Fryeburg, Maine
Robert S. Marnoy, A.B., M.D.	Newton, Massachusetts
Arthur H. McIntosh, B.S., M.S.A., S.M., S.M. IN HYG. (in absentia)	Jamaica Plain, Massachusetts
Edward N. McIntosh, S.B., M.D., S.M. IN HYG.	David City, Nebraska
Alexander J. McLean, B.E., M.E., S.M. IN HYG.	Blackwood, Australia
Siri V. Melchior, A.B.	Berne, Switzerland
Phyllis B. Michelsen, A.B., S.M. (in absentia)	New Bedford, Massachusetts
Bess I. Miller, A.B.	Gary, Indiana
Ralph E. Miller, A.B., M.D., S.M. IN HYG.	Hanover, New Hampshire
Ralph E. Minear, Jr., A.B., M.D., M.P.H.	San Antonio, Texas
Augustine E. Moffitt, Jr., A.B.	Winchester, Massachusetts
Brian V. Mokler, A.B., S.M., S.M. IN HYG.	Belmont, Massachusetts
Richard R. Monson, S.B., M.D., S.M. IN HYG.	Moorhead, Minnesota
Gordon T. Moore, A.B., M.D.	Cambridge, Massachusetts
Jean E. Morehead, A.B., M.P.H.	Needham, Massachusetts
Alan S. Morrison, A.B., M.D.	Boston, Massachusetts
Gretel S. Munroe, A.B., A.M.	New York, New York
Lechaim Naggan, B.MED.SCI., M.D., M.P.H. (in absentia)	Herzlia, Israel
Raymond K. Neff, A.B., S.M. IN HYG.	Manhasset, New York
Raymond R. Neutra, A.B., M.D.	Los Angeles, California
Francis K. Nkrumah, M.D.	Elmira, Ghana
John O. Ojetunde, S.B.	Ibadan, Nigeria
Julia A. Ojiambo	Nairobi, Kenya

James L. Oser, B.C.E., M.S.S.E.	Baberton, Ohio
Ruth H. Palmer, B.A., M.B.,B.CH., M.A.	Newton, Massachusetts
Chandra P. Pant, B.SC., M.SC., PH.D.	Dania, U. P. India
Lawrence J. Partridge, Jr., S.B., S.M.	Pittsfield, Massachusetts
Henry P. Pendergrass, A.B., M.D.	Weston, Massachusetts
Rudolph W. Pierce, S.B., M.D.	Attleboro, Massachusetts
Cedric W. Porter, Jr., A.B., M.D.	Wellesley, Massachusetts
Anita F. Posner, M.D.	Los Angeles, California
Robert B. Posner, A.B., S.M., M.D.	Los Angeles, California
John W. Poundstone, A.B., M.D., M.P.H.	Lexington, Kentucky
Eileen W. Prince, A.B., S.M. IN HYG.	Deerfield, Massachusetts
Manmohan V. Ranadive, M.B.,B.S., M.I.H.	Bombay, India
Alexander M. Rankin, M.B.,B.S., D.T.M.H.	Perth, W. Australia
Chinta K. Rao, B.SC., M.B.,B.S., D.P.H.	Delhi, India
Noel D. Richards, B.S., M.A., PH.D.	Nottingham, England
Anthony Rocha	Fall River, Massachusetts
Jean A. Rochon, A.B., LL.L., M.D., M.P.H.	Montreal, Canada
Edward J. Rolde, A.B., M.D., S.M., IN HYG.	Weston, Massachusetts
Stephen N. Rosenberg, A.B., M.D.	Great Neck, New York
Gloria A. Rudisch, A.B., M.D.	Brookline, Massachusetts
Richard M. Ryan, Jr., A.B., S.M., S.M. IN HYG.	Dorchester, Massachusetts
Amin K. Said, M.B.,B.CH., M.P.H., D.P.H., S.M.	Cairo, Egypt
David Savitz, A.B., M.D.	Brookline, Massachusetts
Charles H. Sawyer, S.B., S.M., M.D., M.P.H.	Tolovana, Oregon
Herbert E. Segal, A.B., M.D.	Silver Spring, Maryland
Stewart Shapiro, A.B., D.M.D.	Randolph, Massachusetts
Ti-Ke Shen, S.B., S.B., S.M.	Taiwan, China
Purushottam N. Shrestha, M.B.,B.S.	Kathmandu, Nepal
Mervyn F. Silverman, S.B., M.D.	Washington, D.C.
Simon J. Simonian, M.B.,B.S., B.A., S.M. IN HYG.	Letchworth, Hertfordshire, England
Jerome H. Smith, S.B., S.M., M.D.	Jamaica Plain, Massachusetts
Otto W. Steenfeldt-Foss, M.D.	Oslo, Norway
Judith S. Stern, S.B., S.M. IN HYG.	New York, New York
Vincent P. Sullivan, Jr., S.B., M.D.	Needham, Massachusetts
Thalanayar K. Sundaresan, M.A.	Madras, India
Robert J. Szot, A.B., S.M.	Passaic, New Jersey
Walter J. Tardy, Jr., A.B., M.D.	Detroit, Michigan
Davida E. Taylor, A.B., M.D.	Berkeley, California
Daniel J. Thomas, S.B., M.D.	Philadelphia, Pennsylvania

Herbert M. Thomas, S.B., M.D., D.T.M.	Monrovia, Liberia
Hugh H. Tilson, A.B., M.D.	Vancouver, Washington
Paul B. Tindall, B.S.E.E.	Orlando, Florida
Pamela A. Trueheart, A.B.	Pittsford, New York
Henry W. Vaillant, A.B., M.D.	Bloomfield Hills, Michigan
Luk Van Parijs, M.D., A.B.	Leuven, Belgium
John F. Vining III, S.B., S.M. IN HYG.	West Roxbury, Massachusetts
Joseph K. Wagoner, S.B., S.M.	Rochester, Minnesota
James H. Warram, S.B., M.D., S.M. IN HYG.	Oklahoma City, Oklahoma
Noel S. Weiss, A.B., M.D.	Boston, Massachusetts
Chi-Pang Wen, B.M.	Taipei, Taiwan
Earl I. White, S.B., M.S.	San Diego, California
Neva M. Wieseke, A.B., S.B., M.D.	Marshall, Minnesota
Christine L. Williams, S.B., M.D.	Boston, Massachusetts
James A. Williams, B.SC., M.SC.	Bridgetown, Barbados
Nancy E. Williamson, A.B.	Ypsilanti, Michigan
Ronald E. Wyzga, A.B., S.M.	New Bedford, Massachusetts
Elihu York, S.B., M.D.	Bar Harbor, Maine
George F. Zinninger, A.B., M.D.	Boston, Massachusetts

Part-Time Special Students 1968–69

Tomas M. Botts, A.B., M.S.P.H.	Newton, Massachusetts
Donald O. Castell, A.B., M.D.	West Newton, Massachusetts
Bernard D. Challenor, A.B., M.D., M.P.H.	Brooklyn, New York
Samuel Shapiro, M.B.,B.CH., M.R.C.P., M.R.C.P.E.	Johannesburg, South Africa

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Degrees

On June 13, 1968, the following degrees were conferred:

DOCTOR OF PUBLIC HEALTH

Rodrigo Guerrero, M.D. (*Universidad del Valle, Colombia*) 1962, S.M. IN HYG. (*Harvard Univ.*) 1966.
Thesis: Time of Insemination in the Menstrual Cycle and its Effects on the Sex Ratio
Special Field: Demography & Human Ecology and Epidemiology

Debhanom Muangman, A.B. (*Grinnell Coll.*) 1958, M.D. (*Jefferson Medical College*) 1962, M.P.H. (*Harvard Univ.*) 1965.
Thesis: Studies on Discharge of Sindbis Virus from the Mouthparts and Anus of Infected *Aedes Aegypti*
Special Field: Tropical Public Health

DOCTOR OF SCIENCE IN HYGIENE

Tomio Hirohata, M.D. (*Kyushu Univ., Japan*) 1960, S.M. IN HYG. (*Harvard Univ.*) 1965.
Thesis: The Relationship Between Gastric Ulcer and Gastric Cancer
Special Field: Epidemiology

Alice Marie Hosack, S.B. (*Univ. of Buffalo*) 1945, A.M. (*Univ. of Chicago*) 1951, S.M. IN HYG. (*Harvard Univ.*) 1959.
Thesis: A Comparison of Crises: Mothers' Early Experiences with Normal and Abnormal First-born Infants
Special Field: Maternal & Child Health (Mental Health)

Robert Rodolphe Lauwerys, M.D. (*Louvain Univ., Belgium*) 1962, M.I.H. (*ibid.*) 1965, S.M. IN HYG. (*Harvard Univ.*) 1966.
Thesis: Inactivation of Paraoxon By Mammalian Tissues and its Toxicological Implication
Special Field: Toxicology

Raymond L. H. Murphy, Jr., S.B. (*Coll. of the Holy Cross*) 1954, M.D. (*New York Univ.*) 1961, M.P.H. (*Harvard Univ.*) 1965.
Thesis: Asbestosis in Pipe Coverers Engaged in New Ship Construction
Special Field: Occupational Medicine

Thora J. Runyan, S.B. (*Univ. of Idaho*) 1961.
Thesis: The Effect of Vitamin Deficiencies on the Metabolism of Oxalic Acid Precursors in Rats
Special Field: Nutrition

William Scottie Runyan, S.B. (*Univ. of Idaho*) 1960, S.M. (*ibid.*) 1962.
Thesis: Characteristics of CO_2 Deficiency in L Cells
Special Field: Nutrition

Anton Ferdinand Vierling, S.B. (*Univ. of Notre Dame*) 1961, S.M. (*Univ. of Connecticut*) 1963, S.M. IN HYG. (*Harvard Univ.*) 1964.
Thesis: Circulating Antidiuretic Hormone in the X-Irradiated Rat
Special Field: Radiological Health

MASTER OF PUBLIC HEALTH

Cyril Amechi Akpom, M.B., CH.B., (*Univ. of Aberdeen, Scotland*) 1963.

Henry David Banta, M.D. (*Duke Univ.*) 1963.

Glen Roy Brubaker, S.B. (*Eastern Mennonite Coll.*) 1962, M.D. (*Univ. of Pennsylvania*) 1966.

Donald Edward Carey, A.B. (*Princeton Univ.*) 1951, M.D. (*Johns Hopkins Univ.*) 1955.

N. Bruce Chase, S.B. (*West Virginia Univ.*) 1958, M.D. (*Duke Univ.*) 1964.

Joseph Allen Cook, A.B. (*Univ. of Oklahoma*) 1956, M.D. (*Vanderbilt Univ.*) 1964.

Pedro Bolongaro-Crevenna, M.D. (*National Autonomous Univ. of Mexico*) 1966.

Burford Wallace Culpepper, S.B. (*Univ. of Georgia*) 1952, M.D. (*Medical Coll. of Georgia*) 1965.

Norman DeJong, D.D.S. (*Northwestern Univ.*) 1967.

Richie Sloan Dryden, S.B. (*Texas A&M Univ.*) 1960, M.D. (*Baylor Univ.*) 1964.

Ronald Dale Eckoff, S.B. (*Univ. of Michigan*) 1960, M.D. (*ibid.*) 1964.

Mata Hilgeson Flom, A.B. (*Wellesley Coll.*) 1961, S.M. (*Northwestern Univ.*) 1965, M.D. (*ibid.*) 1965.

Charles Ambrose Lorenz Forbes, M.B.,B.S. (*Univ. of Ceylon*) 1957.

Robert Alan Fortuine, A.B. (*Cornell Univ.*) 1956, M.D.,C.M. (*McGill Univ., Canada*) 1960.

Richard Burr Froh, PHARM.D. (*Univ. of California at San Francisco*) 1967.

James Thomas Grosshans, M.D. (*Univ. of Illinois*) 1962.

Seymour Grufferman, S.B. (*City Coll. of New York*) 1960, M.D. (*State Univ. of New York at Syracuse*) 1964.

Jean-Pierre Habicht, M.D. (*Univ. of Zurich, Switzerland*) 1962.

Douglas Ira Hammer, S.B. (*Tufts Univ.*) 1958, M.D. (*ibid.*) 1962.

Paul Stevens Hill, A.B. (*Univ. of Texas*) 1955, M.D. (*ibid.*) 1959.

Samer Saleh Islam, M.B.,B.CH., (*Alexandria Univ., U.A.R.*) 1963, D.C.H. (*ibid.*) 1965, D.M. (*ibid.*) 1966.

Andrew Gaston Jessiman, B.A. (*Cambridge Univ.*) 1943, A.M. (*ibid.*) 1945, M.B.,B.CHIR. (*ibid.*) 1946, F.R.C.S. (*ibid.*) 1948.

Albert Jacob Kazis, D.M.D. (*Tufts Univ.*) 1949.

Sue Young Sook Kimm, A.B. (*Bryn Mawr Coll.*) 1960, M.D. (*Yale Univ.*) 1964.

Leonard Joel Kirschner, A.B. (*Williams Coll.*) 1957, M.D. (*Albany Medical Coll.*) 1961.

Stanley Gerald Kleiner, A.A. (*Fullerton Jr. Coll.*) 1962, D.PHARM. (*Univ. of California at San Francisco*) 1967.

Ronald Eugene Krum, A.B. (*Columbia Union Coll.*) 1956, M.D. (*Loma Linda Univ.*) 1960.

Hsien Che Kuo, B.M.D. (*National Taiwan Univ.*) 1963.

Dennis Hugh Leverett, D.D.S. (*Ohio State Univ.*) 1956.

Craig Hartman Llewellyn, A.B. (*Yale Univ.*) 1959, M.D. (*ibid.*) 1963.

Gerald Lee Looney, A.B. (*Johns Hopkins Univ.*) 1959, M.D. (*ibid.*) 1963.

Esther Galima Mabry, B.SC. (*Univ. of the Philippines*) 1955, M.D. (*Far Eastern Univ., Philippines*) 1960.

John Patrick Maher, S.B. (*St. Peter's Coll.*) 1956, M.D. (*State Univ. of New York — Downstate Medical Center*) 1960.

Hasi Majumdar Venkatachalam, I.SC. (*Calcutta Univ., India*) 1957, M.B.,B.S. (*ibid.*) 1962.

Ralph Edward Minear, Jr., A.B. (*Univ. of Texas*) 1956, M.D. (*ibid.*) 1960.

John Philip Morey, A.B. (*Rutgers Univ.*) 1959, M.D. (*Cornell Univ.*) 1963.

Carlos Alston Mulraine, M.B.,B.S. (*Univ. of London*) 1964.

Gustavo Adolfo Parajón, A.B. (*Denison Univ.*) 1959, M.D. (*Western Reserve Univ.*) 1963.

John Walker Poundstone, A.B. (*St. John's Coll.*) 1962, M.D. (*Univ. of Kentucky*) 1966.

K. M. Maqsudur Rahman, M.B.,B.S. (*Dacca Medical Coll., Pakistan*) 1953, D.T.C.D. (*Welsh National School of Medicine*) 1961.

Paul Christopher Rambaut, B.SC. (*McGill Univ., Canada*) 1962, M.SC. (*ibid.*) 1964, S.D. (*Massachusetts Institute of Technology*) 1966.

Vladimir Rathauser, M.D. (*Univ. of Buenos Aires, Argentina*) 1962.

Edith Haim Reinisch, S.M. (*Univ. of Wisconsin*) 1942, S.M. IN HYG. (*Harvard Univ.*) 1967.

Jean Albert Rochon, B.A. (*Univ. of Montreal, Canada*) 1958, LL.L. (*ibid.*) 1961, M.D. (*Laval Univ., Canada*) 1966.

Ensor Rodriguez-Lopez, M.D. (*Univ. de Salamanca, Spain*) 1961.

Philip Ross, A.B. (*Brown Univ.*) 1949, S.M. (*Univ. of Massachusetts*) 1951, A.M. (*Harvard Univ.*) 1956, PH.D. (*ibid.*) 1958.

Ronald Tilden Rozett, A.B. (*New York Univ.*) 1959, M.D. (*Harvard Univ.*) 1963.

Harvey Lee Ruben, S.B. (*Univ. of Pittsburgh*) 1963, M.D. (*Northwestern Univ.*) 1966.

Roberta Apfel Savitz, A.B. (*Brandeis Univ.*) 1958, M.D. (*Boston Univ.*) 1962.

John Anthony Sbarbaro, S.B. (*St. Mary's Coll.*) 1958, M.D. (*Johns Hopkins Univ.*) 1962.

John Schulman, Jr., S.B. (*Yale Univ.*) 1942, M.D. (*Univ. of Pennsylvania*) 1946.

Duane LeClere Smith, S.B. (*Denison Univ.*) 1960, M.D. (*Boston Univ.*) 1964.
Michael MacCracken Stewart, A.B. (*Princeton Univ.*) 1957, M.D. (*Harvard Univ.*) 1965.
Willem van Pelt, M.D. (*Univ. of Amsterdam, The Netherlands*) 1957.
Oscar Wand, S.B. (*Yale Univ.*) 1960, M.D. (*ibid.*) 1964.
Robert Paul Younes, A.B. (*Colby Coll.*) 1959, M.D.,C.M. (*McGill Univ., Canada*) 1963.

MASTER OF INDUSTRIAL HEALTH

Manmohan Vishwanath Ranadive, M.B.,B.S., (*Univ. of Bombay, India*) 1961.

MASTER OF SCIENCE IN HYGIENE

(in the field of Behavioral Sciences)

Louis Paul Bozzetti, Jr., A.B. (*Andrews Univ.*) 1956, M.D. (*Loma Linda Univ.*) 1960.
Kim Alan Keeley, A.B. (*Yale Univ.*) 1960, M.D. (*Cornell Univ.*) 1964.

(in the field of Biostatistics)

Hanna Gelband, S.B. (*City Coll. of New York*) 1963.
Ralph Leo Kent, Jr., A.B. (*Univ. of Notre Dame*) 1964.
Nancy Role Mendell, A.B. (*Smith Coll.*) 1966.

(in the field of Demography & Human Ecology)

Elizabeth Ann Murphy, A.B. (*Connecticut Coll. for Women*) 1965, M.P.H. (*Yale Univ.*) 1967.

(in the field of Environmental Health)

Alexander John McLean, B.E. (*Univ. of Adelaide, Australia*) 1961, M.E. (*ibid.*) 1968.
George Brooks Schreiber, S.B. (*Massachusetts Institute of Technology*) 1966.

(in the field of Epidemiology)

Guy Rene Newell, Jr., S.B. (*Tulane Univ.*) 1959, M.D. (*ibid.*) 1962.
Gopal Chandra Pain, M.B.,B.S. (*Calcutta Univ., India*) 1956, D.P.H. (*ibid.*) 1960.

(in the fields of Epidemiology and Biostatistics)

Dimitrios Trichopoulos, M.D. (*Univ. of Athens, Greece*) 1965.

(in the field of Health Services Administration)

Vicente Borrero-Restrepo, M.D. (*Univ. Del Valle, Colombia*) 1965, M.P.H. (*ibid.*) 1967.

David McFall, A.B. (*Albright Coll.*) 1959, A.M. (*American Univ.*) 1963.
Faye Helen Weston, A.B. (*Central State Coll.*) 1953, M.S.W. (*Univ. of Kansas*) 1955.

(in the field of Industrial Hygiene)

James Edward Hickey, S.B. (*Providence Coll.*) 1962.
Brian V. Mokler, A.B. (*Pomona Coll.*) 1958, S.M. (*Massachusetts Institute of Technology*) 1960.
Gilbert Franklin Stone, S.B. (*Austin Peay State Coll.*) 1952, S.M. (*Univ. of Tennessee*) 1966.

(in the field of Nutrition)

Julie Eileen Brown, S.B. (*Mercyhurst Coll.*) 1945.
Gary Sell Leske, D.D.S. (*Creighton Univ.*) 1962, M.P.H. (*Harvard Univ.*) 1966.

(In the field of Occupational Medicine)

Robert Elmo Lee Craig, A.B. (*Harvard Univ.*) 1958, M.D.,C.M. (*McGill Univ., Canada*) 1962, M.P.H. (*Harvard Univ.*) 1967.

(in the field of Radiological Health)

George Edward Chabot, Jr., A.B. (*Harvard Univ.*) 1961.
Daniel Anthony Garcia, D.D.S. (*Loyola Univ.*) 1953, M.D.S. (*Tufts Univ.*) 1966.
Barbara Nan Lieb, A.B. (*Bryn Mawr Coll.*) 1965, M.A.T. (*Harvard Univ.*) 1966.
Eileen Walkavich Prince, A.B. (*Anna Maria Coll.*) 1966.
Douglas Greenleaf Smith, A.B. (*Franklin & Marshall Coll.*) 1964.
Stephen Bruce Van Camerik, B.S. (*Swarthmore Coll.*) 1964.

On March 3, 1969 the following degrees were conferred:

DOCTOR OF SCIENCE IN HYGIENE

Michael Allan Davis, S.B. (*Worcester Polytech.*) 1962, S.M. (*ibid.*) 1964, S.M. IN HYG. (*Harvard Univ.*) 1965.
Thesis: Relative Biological Effectiveness of the $^{10}B_{(n,\alpha)}^{7}Li$ Reaction Including Chemical Synthesis and Toxicology of Potential Tumor Localizing Agents
Special Field: Radiological Health

Johanna Todd Dwyer, S.B. (*Cornell Univ.*) 1960, S.M. (*Univ. of Wisconsin*) 1962, S.M. IN HYG. (*Harvard Univ.*) 1965.
Thesis: Attitudes Toward Weight and Dieting Among Adolescents and Adults
Special Field: Nutrition

MASTER OF PUBLIC HEALTH

Robert Benjamin Berg, A.B. (*Dartmouth Coll.*) 1949, M.D. (*Harvard Univ.*) 1952.

David Goodman, A.B. (*Univ. of South Dakota*) 1949, S.B. (*ibid.*) 1951, M.D. (*Univ. of Pittsburgh*) 1953.

Henry Pancoast Pendergrass, A.B. (*Princeton Univ.*) 1948, M.D. (*Univ. of Pennsylvania*) 1952.

David Savitz, A.B. (*Harvard Univ.*) 1958, M.D. (*ibid.*) 1963.

MASTER OF SCIENCE IN HYGIENE

(in the field of Demography & Human Ecology)

Henry Winchester Vaillant, A.B. (*Harvard Univ.*) 1958, M.D. (*ibid.*) 1962.

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KEY TO MAP

HARVARD SCHOOL OF PUBLIC HEALTH

1. Rotch Building
   55 Shattuck Street
   - Administration
   - Behavioral Sciences
   - Health Services Administration
   - Maternal and Child Health

2. Health Sciences Laboratories
   665 Huntington Avenue
   - Biostatistics
   - Demography and Human Ecology
   - Epidemiology
   - Kresge Center for Environmental Health (Environmental Health Sciences and Physiology)
   - Microbiology
   - Nutrition
   - Tropical Public Health

3. Site of Building 3

4. Henry Lee Shattuck International House
   199–203–207 Park Drive

HARVARD MEDICAL SCHOOL

5. Medical School Quadrangle
   25 Shattuck Street

5A. Building A — Administration

6. Vanderbilt Hall
   (Medical Area Health Services)
   109 Avenue Louis Pasteur

7. HARVARD SCHOOL OF DENTAL MEDICINE
   188 Longwood Avenue

8. FRANCIS A. COUNTWAY LIBRARY OF MEDICINE
   10 Shattuck Street

9. PETER BENT BRIGHAM HOSPITAL

10. MASSACHUSETTS MENTAL HEALTH CENTER

11. CHILDREN'S CANCER RESEARCH CENTER

12. CHILDREN'S HOSPITAL MEDICAL CENTER

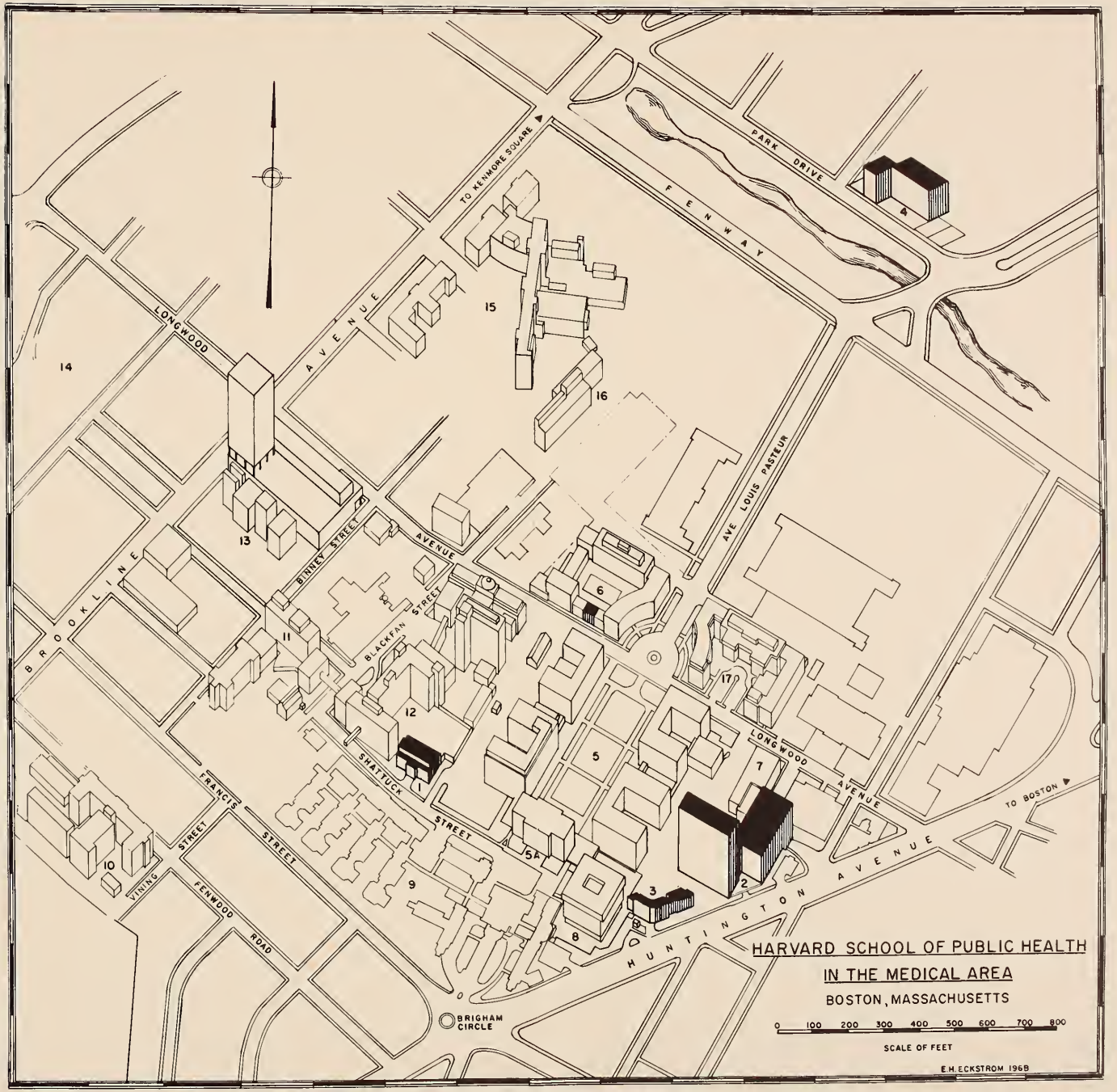
13. SHIELDS WARREN RADIATION LABORATORY

14. NEW ENGLAND DEACONESS HOSPITAL

15. BETH ISRAEL HOSPITAL

16. JUDGE BAKER GUIDANCE CENTER

17. BOSTON HOSPITAL FOR WOMEN (LYING-IN DIVISION)



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